HARDWARE BUYER'S SUPERGUIDE

JUNE 1994

# PC Computing

Special Issue

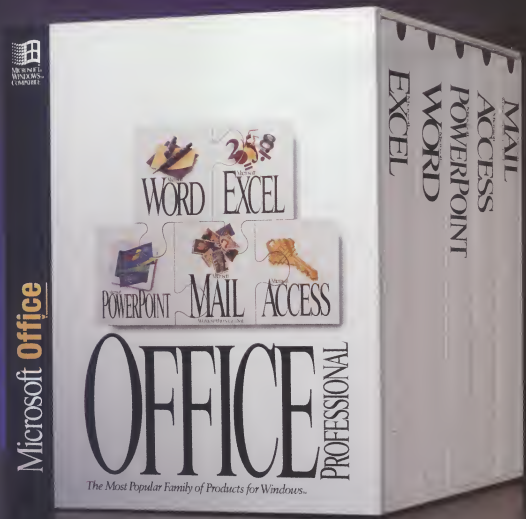
# Best 200

Find the hottest **Systems,** the most versatile office **Printers,** the coolest **Video,** the best solutions for **Storage** and the smart buys in **Peripherals**

[redacted]

# FROM NOW ON, THESE ARE THE QUESTIONS YOU'LL BE ASKING BEFORE YOU BUY SOFTWARE.

# HERE'S WHERE YOU CAN FIND THE ANSWERS.



## Putting it all together in one place.

You have a number of different jobs to accomplish. Every day. So your business software is key to putting together all the right answers.

Enter the new Microsoft® Office.

For the first time ever, individual programs work together like a single, insightful program.

What does that mean? You can concentrate on the task at hand. And forget about jumping around between programs.

This power to work like one program springs from our unique innovations. Take OfficeLinks. Built with the integration standard, OLE 2.0, it lets you drag a chart from your spreadsheet and drop it into your word processor. Then automatically convert everything into presentation slides. Or create custom letters from your database of clients with just a click. All as if you're using one program.

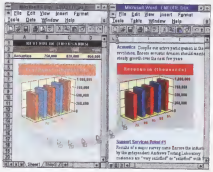
These programs even think the same. Their exclusive IntelliSense™ technology can sense what you need, then make everyday jobs like fixing typos happen automatically.

Together, they're so notably consistent in looks, actions and instincts, there's no question you'll think of them as one program.

And only the Microsoft Office combines it all with unlimited no-charge support. Microsoft just won the ITAA Quality Award* for that support. A singular distinction.

Of course all this "oneness" could only come from the most acclaimed, technically proficient individual programs around—Word, Microsoft Excel, PowerPoint® and Microsoft Access.®

We've barely scratched the surface here of what it means for all your programs to work together like one. You'll want to read the reviews



yourself, talk to people who use it, scout around at your nearest reseller. And by all means, call us at (800) 894-6642, Dept. LB8, to find out more. Any questions?

**The TipWizard™ assistant in Microsoft Excel tracks the way you work and offers smart tips on how to save time.**

**(Upper right) Just click a button on the Microsoft Office Manager (MOM) toolbar and your choice of first-rate programs pops into action.**

**(Lower right) Need to move information between programs? Just drag and drop it from one place to another. Then edit right in place.**

Microsoft Office

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1. Do your programs work together intuitively as if they were all one program?

2. Can you simply drag text, data and graphics from one program and drop them into another?

3. Is your software intelligent? For instance, can it handle everyday tasks automatically?

4. Are your programs recognized as the best in their category?

5. Do your menus, toolbars and other elements look alike and work in the same easy way?

6. Do your programs have no-charge product support? For how long?

7. Ultimately, is it worth getting software that doesn't do all these things?

*The new* HP DeskJet 310 *printer.*

# Desk

# optional.

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If that's not enough for you, a whole family of optional accessories is available, including a color kit for just $49, and a multi-page sheet feeder for easier desktop printing.

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Corporation. [1]Size and weight indicated are for the Contura Aero 4/25 Model 84 and Model 170. Model 4/33C pictured here weighs 4.2 lbs. [2]Batteries and certain options covered by a one-year warranty. Certain restrictions and exclusions may apply. For Aero product information, select document number 4010. [3]Estimated reseller price. Prices will vary. Model 4/33C pictured here starting at $2,199. The Intel Inside logo is a registered trademark of the Intel Corporation.

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SUPERGUIDE

## Searching For Just The Right Hardware?

One size doesn't fit all. That's why you need our **SUPERGUIDE**—to help you make just the right business buy. Is **PERFORMANCE** your main concern? We offer the most definitive ratings. Is **USABILITY** at the top of your list? We zero in on the most crucial design details. Whether it's price, **TECHNOLOGY**, service, or support, you'll find it all. Then check out our **DECISION MAKERS** to help you choose precisely the right tools for the job.

PHOTOGRAPHS BY MARK JOHANN

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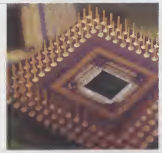

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COVER PHOTOGRAPHS BY MARK JOHANN, NEW! PHOTOGRAPH BY CHRISTINE ALCINO

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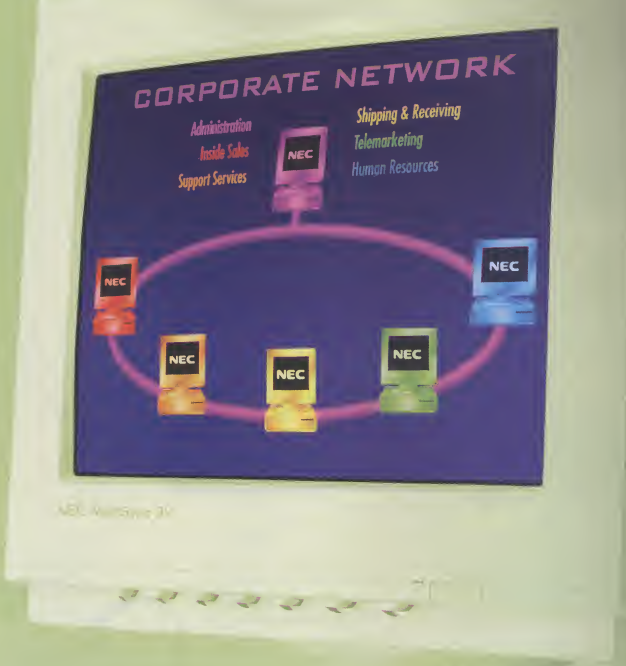


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- **Upgradable to the OverDrive™ CPU based on Intel Pentium™ architecture**
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- 128KB ultra-fast cache
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- 11-bay tower case
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- Microsoft DOS
- Windows for Workgroups 3.11

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- **Microsoft™ Money**
- **Microsoft™ Entertainment Pack**
- **14,400 Baud high speed fax/modem**
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| | |
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# Don't settle for this computer label...

William D. Smith
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Sometown, US 01010

# When you can have this!

General Pediatrics Center

Physician: Lammerding
Patient: Bymes
Patient #: 33457

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**The P-TOUCH PC can turn virtually any computer image into a laminated, adhesive-backed, professional quality label.**

Want to create a lasting impression? Nothing could be easier, faster or more efficient than the P-Touch PC Computer Label Maker.

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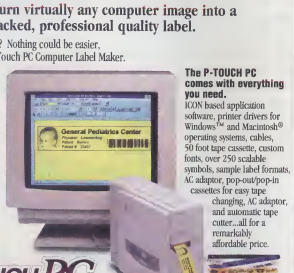
If you can create it on your screen, you can print it on a P-Touch PC label!

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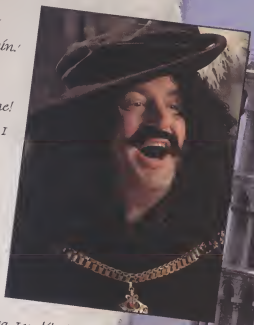
The Audit Bureau

# "If I Only Had A Gateway!"

There I was, eating Mama's spaghetti, when Guido and the boys come over, 'Yo Bonanno! Your tower, it's a leanin.'



Mama-mia! What's a matta me! That's a last time I buy a kit from the Towers-R-Us catalog. Never get enough cement mix. So, I used my mother-in-law's linguine sauce as extra cement. 'Oh boya, I no like how that turned out. And that's a last time I tell the workers we eat only after the foundation is laid!

I guess they tried to tell me the soil was bad. I thought they said the 'royal' was bad. And they were right – that King Antonio was a pretty nasty.

If I had a Gateway P5-90, I coulda designed my own tower. And it woulda been magnifico! The best tower the world ever saw.

Looka me. I coulda done so much better. It's a too late for me and my tower. Don't you be offa plumb, and be saying like me, 'Gee, I wish I woulda had a Gateway.'

*Bonanno Pisano was the chief engineer of the Tower of Pisa. Soft soil and only 10 feet of foundation caused the tower, started in 1174, to begin leaning almost immediately. Over the years all efforts to halt the leaning have been futile. Bonanno was not a Gateway user.*

# "Gateway's Pentium Architecture Would've Set Me Straight"

...Bonanno Pisano, engineer, 1174

***"If I only had a Gateway!"*** — the anguished, rueful cry of a non-Gateway user. The lesson: Don't leave the success of *your* landmark projects to an archaic system. Get a Gateway 2000® PC and you'll have the latest technology in a high-quality PC, built to stand the tests of time. You get straightforward service and support from Gateway's knowledgeable employees. And best of all ... no regrets coming back to haunt you!

## Gateway's Superstructures

Look at it from this angle. You just gotta have the most powerful PC architecture available today, right? But there's no way you want to pay skyscraper prices, true? Your solution? Gateway 2000's P5 systems! These Pentium™-based machines are designed to give you all-around monumental performance — they're some of the fastest PCs you can find today! Capice?

Based on Intel®'s Pentium processor, all P5 models include a PCI local bus and an enhanced PCI/IDE controller allowing your hard drive to transfer data *up to twice as fast* as non-enhanced IDE systems. Gateway's P5-60 and P5-66 models, and our three power-packed **90MHz** models (*starting at just $2,995*), give you a value that towers over the competition!

Gateway's P5-90 machines use Intel's super 90MHz processor for foundation-shaking power. You get a rare combination of colossal power and performance, *and* a great price. Ah, magnifico! Just look at these features: performance-boosting 540MB hard drives, 8MB or 16MB RAM, double-speed CD-ROMs, high-end graphics controllers and your choice of application software. Two 90MHz systems also include 16-bit sound cards and Yamaha speakers. Go ahead and compare. You'll see that these value-packed PCs stand unmatched.

Get all the tools to create lasting impressions with any Gateway P5 system. Mama mia — starting from only $2,495, our Pentium values are out of this world!

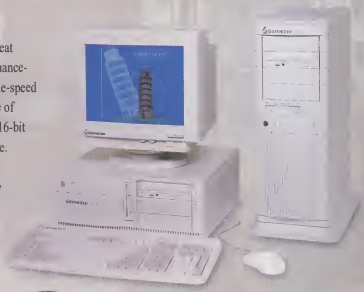
## Classic Attractions

Our 486 PCI machines are Gateway 2000 classics built on a solid foundation of performance and value. Our new **100MHz DX4** machine, priced at $2,495, is based on the fastest 486 processor available! With the same PCI local bus as in our P5 line, all 486 PCIs will give you a great power boost. They include 8MB RAM, 540MB hard drive and a double-speed CD-ROM drive. These 33MHz, 66MHz and 100MHz systems are all upgradable to Pentium technology so you can expand in the future.

## Portable Sidekick *Special Offer!*

A perfect sidekick for your Gateway desktop system is the HandBook® 486 portable PC. It's just like having an extension to your desktop system! Call about our special desktop/HandBook combo today, available only at the time of desktop purchase. Having all the information you rely on, everywhere you go, has never been so easy.

*Gateway's P5-90 and P5-90 Tower systems rise above the competition!*



intel inside pentium PROCESSOR

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800-846-2062

# "A Gateway Portable

Do you know the way to San Josef New York 1235. I traded my $400 organs for the flight to California. Everyone has a hobby, right? Little did I know my obsession with registration mysteris would bring a dark cloud of humility down upon you. I placed my collection of mysteris all around me. Mr. Piggy on the Throttle. The Morton Salt ad by The Atlanter and my favorite, the Mtns. right by The compass — hundreds of mysteris all over The cramped cockpit. As I took off into The wild blue yonder, did I hear someone say, Hey, Douglas, you're going The wrong way? Ah, They must've said, phase a nice day, I'd been flying awhile when I looked down and Thought – I know They're called The Great Lakes, but This is ridiculous! This compass rights! I whacked it a few Times, one of my dashboard mysteris fell on The floor. My compass wasn't crazy until I put Them back in place. So figure, I continued on. Hey, what's wrong Mr Tiger? A while in Lake Superior. Long yeeled me ocier 27 hours. where's The sun. The darkness? I only see redwoods and Lucky Charmes?

Damn These refrigeration mysteris! Foy was The wife steamed. Hello, honey! Um... I'll be a little late for dinner.' I wish I would had a Gateway portable to keep me on course.


***Heading out on another worldly expedition?*** Whether it's transcontinental or transatlantic, a Gateway portable PC puts you at the controls, steers you in the right direction and sends you flying!

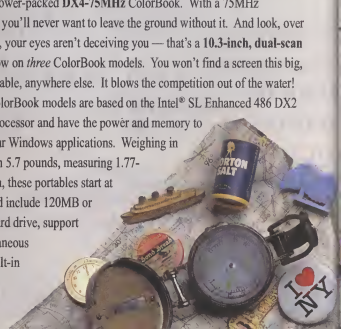
GATEWAY2000
COLORBOOK™

## Flying Machines

How can you go wrong? You can't! A Gateway 2000® ColorBook is just what you need for high-in-the-sky performance.

A portable PC with the supersonic performance of a desktop is yours with the power-packed **DX4-75MHz** ColorBook. With a 75MHz processor, you'll never want to leave the ground without it. And look, over there! No, your eyes aren't deceiving you — that's a **10.3-inch, dual-scan screen**, now on *three* ColorBook models. You won't find a screen this big, this affordable, anywhere else. It blows the competition out of the water!

All ColorBook models are based on the Intel® SL Enhanced 486 DX2 or DX4 processor and have the power and memory to run all your Windows applications. Weighing in at less than 5.7 pounds, measuring 1.77-inches thin, these portables start at $1,995 and include 120MB or 250MB hard drive, support for simultaneous video, built-in trackball,



# "Would've Steered Me The Right Way"

Douglas "Wrong Way" Corrigan, aviator, 1938

*Douglas Corrigan set out in 1938 to fly solo nonstop from New York to California. After taking off in fog, he misread his compass and began flying eastward out over the Atlantic Ocean. After 27 hours he landed in Dublin, Ireland, not aware of his mistake. Douglas was not a Gateway user.*

two PCMCIA Type II or one Type III slots, 256 colors running in VGA mode, excellent battery life, and a great suspend/resume feature.

You'll know you're headed in the right direction for top-flight performance when you get a Gateway ColorBook.

## 4 GATEWAY 2000 HANDBOOK® 486

### Take Flight!

It's so lightweight, you'll soar! So powerful, you'll be in awe! That's the HandBook 486 from Gateway 2000. Take flight with this compact little PC no matter where you go. Taking the world by storm with a footprint of just 9.75 inches by 5.9 inches, the HandBook 486 weighs in at (*are you sitting down?*) under three pounds! That's lighter than any Intel 486-based portable available today.

Still up in the air about the combination of portability and power? Head this way, because the HandBook 486 is a real PC and the only DX2 subnotebook found on any continent. No compromises here.

You'll get an IDE hard drive with up to 130MB, standard 4MB or 8MB RAM upgradable to 20MB, a backlit VGA screen, 78-key keyboard, EZ Point™ integrated pointer, and that terrific suspend/resume feature.

Whether you're a world traveler or an urban commuter, the Gateway 2000 ColorBook and HandBook offer you all the perks you deserve. So don't pick up the phone and go the "wrong way." Call Gateway 2000 straight-away!

intel inside

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# "If I Only

Ever have one of those days? I was eating my Eggs Benedict when the wife looked up and snarled, 'You're not going to hang out with those friends of yours today, are you?' What did she mean by that? These were guys in togas, they didn't have much to hide.

But even the oracle told me not to go to work, 'You shall regret the company you keep.' What did that mean? After years of running amuck, conquering empires, and going on Roman holidays together, I felt I knew these guys.

After making a stop at the V and X cent store for eucalyptus lip balm, I continued on to the Senate house. Second mistake of the day. The first was getting out of bed.

Even as my last breath passed my lips, I wondered, 'WHY?' Death at the hands of my closest friends, then a salad and one of the hottest months of the year named after me. Hardly a fitting end for a man of my stature. Just goes to show no matter how much time you spend with guys in togas, you never really know them.

Man, I wish I would've had friends in the business.

***Sometimes it's hard to know who to trust***, especially in the competitive PC arena. You'll find our honest, hard-working employees to be allies, supporting villages and empires alike—wherever Gateway 2000® computers are found. Our loyal customers have helped us to become a Fortune 500 company, but we're not resting on these laurels. Every Gateway 2000 employee is committed to our philosophy of providing customers with a quality product at an unbeatable value, along with the best service in the land. You have our word on it.

## Service Allies

As a Gateway 2000 customer, you receive toll-free technical support for the life of your system. And with the purchase of a Gateway modem you'll get Triton's CoSession™ Host at no additional charge. CoSession Host, a remote diagnostic software,

*Photo courtesy of Motion Picture & Television Photo Archive*

## HANDBOOK® 486

- Weight: 2.94 Lbs.
- Dimensions: 9.75" x 5.9" x 1.6"
- SL Enhanced Intel® 486 or DX2 Processor
- 4MB or 8MB RAM (expands to 20MB)
- 80 to 130MB IDE Hard Drive
- 7.9" Backlit VGA Display
- NiMH Battery & AC Pack
- Suspend/Resume Feature
- 1 PCMCIA Type II Slot
- EZ Point™ Integrated Pointer
- 78-Key Keyboard
- Parallel, Serial & PS/2® Ports
- MS Works for Windows™ 3.0
- MS-DOS® 6.2, WFW™ 3.11 & Serial Transfer Cable

### HANDBOOK 486SX-25

With 25MHz 486SX CPU, 4MB RAM and 80MB Hard Drive

**$1495**

### HANDBOOK 486SX-25

With 25MHz 486SX CPU, 4MB RAM and 130MB Hard Drive

**$1595**

### HANDBOOK DX2-40

With 40MHz DX2 CPU, 8MB RAM, 130MB Hard Drive, Extra NiMH Battery and Leather Carrying Case

**$2295**

### HANDBOOK 486SX-25

With 25MHz 486SX CPU, 8MB RAM, 130MB Hard Drive and Leather Carrying Case

**$1895**

## PORTABLE OPTIONS

Peripherals and upgrades available only with purchase of a system.

*PCMCIA Cards:*
- TelePath™ 14,400/14,400 fax/modem. **$249**
- 9,600/2,400 fax/modem. **$149**
- Ethernet adapter. **$149**
- Token Ring adapter. **$449**
- HandBook VGA adapter. **$229**

*Batteries:*
- 2.2Ah NiMH batteries. **$89**

*Diskette Drive:*
- HandBook external 1.44MB. **$99**

*Cases:*
- ColorBook **$49**, HandBook **$55**

*Extended VIP Warranty:*
- We'll ship a replacement within 24 hours during warranty. Point of sale only. **$100**

## COLORBOOK™

- Weight: Under 5.7 Lbs.
- Dimensions: 11.7" x 8.5" x 1.77"
- SL Enhanced Intel 486, DX2 or DX4 Processors
- 4MB or 8MB RAM (expands to 8, 12 or 20MB)
- 3.5" 1.44MB Diskette Drive
- Removable 120 to 250MB IDE Drive
- 10.3" or 9.4" VGA Dual-Scan STN Color Display
- NiMH Battery & AC Pack
- Suspend/Resume Feature
- 2 PCMCIA Type II or 1 Type III Slots
- Integrated Trackball (2 buttons)
- 85-Key Keyboard
- Parallel, Serial & PS/2 Ports
- External VGA Port
- MS Works for Windows 3.0
- MS-DOS 6.2 & WFW 3.11

### COLORBOOK 486SX-33

With 33MHz 486SX CPU, 4MB RAM, 120MB Hard Drive and 9.4" LCD

**$1995**

### COLORBOOK DX2-40

With 40MHz DX2 CPU, 4MB RAM, 250MB Hard Drive and 10.3" LCD

**$2495**

### COLORBOOK DX2-50

With 50MHz DX2 CPU, 8MB RAM, 250MB Hard Drive and 10.3" LCD

**$2995**

## COLORBOOK PACKS

Peripherals and upgrades available only with purchase of a system.

*Traveler's Packs:*
- Case, extra battery & PCMCIA 9,600/2,400 fax/modem. **$279**
- Case, extra battery & PCMCIA TelePath fax/modem. **$369**

### COLORBOOK DX4-75

With 75MHz DX4 CPU, 8MB RAM, 250MB Hard Drive and 10.3" LCD

**$3495**

## SOFTWARE & EXTRAS

If a system comes with "choice of application software," choose one of the following packages:
- Microsoft Excel for Windows™
- Microsoft Word for Windows™
- Microsoft Word and Bookshelf,® CD-ROM Edition
- Microsoft PowerPoint for Windows™
- Microsoft Project for Windows™
- Microsoft Access™ for Windows
- Publisher's Pack (CD-ROM only; includes CorelDRAW 3,™ ArtShow, MS Publisher 2.0 & MS Design Pack)
- The Entrepreneur Pack (Works,™ Publisher,™ Money™ & games)
- Borland Paradox® and Quattro® Pro for Windows spreadsheet
- Borland Paradox® and C++ (CD-ROM only)

With desktop and selected portables you also get the following software and extras at no additional charge:
- MS-DOS 6.2 & Windows for Workgroups 3.11
- CoSession™ Host Remote Diagnostics (with all modems)
- QAPlus Diagnostics
- Gateway Computer Glossary
- Gateway Mouse Pad

Systems with CD-ROM drives also include:
- Gateway System CD
- On-Line User's Guide
- Gateway Mall On-Line Catalog

## SERVICE

Every Gateway system is backed by:
- 30-Day Money-Back Guarantee
- One-Year Limited Warranty
- Lifetime Toll-Free Technical Support
- On-Site Service Available To Most Locations For Desktop Systems
- Lifetime BBS Membership
- FaxBack Automated Fax Service

*Our money-back guarantee does not include shipping. On-site service is provided at no charge during warranty if our technicians determine it is necessary. If you'd like to read our warranty and guarantee policies, please call for a free copy.*

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## The Gateway 2000 Family PC™

Listen and watch legendary figures make speeches, or play interactive games, or get a jump on work from the office — all at home! For all ages, every day of the year, the Family PC from Gateway 2000 fits right into your lifestyle with full multimedia capabilities including sound, pictures, animation *and* video.

Priced from $1,495, our Family PCs are loaded with everything you need for a reference library, entertainment center and home office: double-speed CD-ROM drive, 340MB hard drive, data/fax modem, sound card, speakers, and joystick. You also get your choice of one great software bundle from our Family PC software bundles. When you choose our Microsoft® bundle, you'll get MS Encarta, Golf, Money, and Works Multimedia Edition 3.0.

Encarta gives you the complete text of the 29-volume 1992 Funk & Wagnall's New Encyclopedia. Discover a whole new universe with 25,000 articles, 350 music segments, over 100 readings by authors, and samples of more than 45 languages.

You can hit the links year-round with Microsoft Golf. Play the famous Torrey Pines golf course, pick 14 clubs for every game, and consult a golf pro. Walk over the lush course and hear the swish of your club with photo-realistic scenery and real audio.

Use Microsoft Money to take complete control of your finances quickly and easily. You'll always know where your money is, and where it's going with this complete set of financial tools.

These are just a few of the many possibilities of a Family PC from Gateway 2000. Call today for more information on these incredible systems.

*Our Family PC comes with a 14-inch color SVGA monitor, 101-key keyboard, double-speed CD-ROM, sound card, speakers, joystick, fax/modem and multimedia software. You choose one software option from our great Family PC multi-title packages.*

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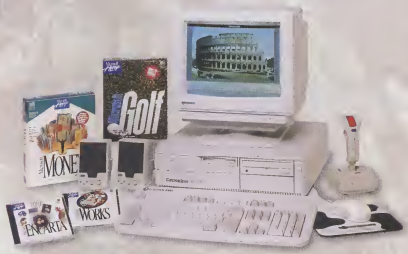


GATEWAY2000

*"You've got a friend in the business."®*

**800-846-2062**

# "Would've Had Friends In The Business"

*Julius Caesar was head of the Roman empire from 49 to 44 B.C. In 44 B.C. he was killed in the Roman Senate house by his friends. Julius did not have friends in the business.*

allows Gateway technical support representatives to troubleshoot your system on-line. They can also edit configuration files; run diagnostics; upload new drivers and files and, in most cases, install them for you

You also get a lifetime Gateway Bulletin Board System (BBS) membership with the purchase of a system and modem. This on-line service gives you a convenient way to communicate with us or with other users. On-line technical support, customer service and sales information are only some of the benefits of Gateway's BBS service. You can also download updated drivers, files and utilities for your Gateway PC through the BBS.

## Payment Options

Gateway accepts most major credit cards and C.O.D. terms, with net 30-day terms and leasing options available to qualified commercial customers. You can also apply for the Gateway 2000 DuoLine™ MasterCard® Card, issued by Dial National Bank. You can make purchases from Gateway and anywhere else MasterCard is accepted with two lines of credit — one for Gateway purchases and one for all other transactions. For Gateway purchases, the card has no annual fee and a low variable interest rate of just 12.9% APR. For other transactions, you get a variable interest rate of 13.9% APR and a low $18 annual fee.*

**Cash advance fee is $1 plus 2% of the amount of the cash advance, but not less than $5 nor more than $10. Financing is available on approved credit with the Gateway DuoLine MasterCard, issued by Dial National Bank, Des Moines, Iowa. The Annual Percentage Rates shown above are current as of April 1, 1994.*

*Bonzono, "Wrong Way," and Julius all portrayed by Gateway 2000 employees.*

## INTEGRATED SYSTEMS

### 4SX-33*/4DX-33*

- Intel® 33MHz 486SX or DX CPU
- 4MB RAM
- 340MB 13ms IDE Hard Drive
- Local Bus Graphics with 1MB
- 3.5" Diskette Drive
- 14" Color CrystalScan® 1024NI
- Mini Desktop Case
- 5 16-Bit ISA Slots
- 101-Key Keyboard & MS Mouse
- MS-DOS® 6.2 & WFW™ 3.11
- MS Works for Windows™ 3.0
- EPA Energy Star Compliant

4SX-33 $1295
4DX-33 $1495

### 4SX-33* FAMILY PC™

- Intel 33MHz 486SX CPU
- 4MB RAM
- 340MB 13ms IDE Hard Drive
- Local Bus Graphics with 1MB
- Double-Speed CD-ROM, 16-Bit Sound Card & Speakers
- 2400/9600 Data/Fax Modem
- 3.5" Diskette Drive
- 14" Color SVGA Monitor
- Mini Desktop Case
- 5 16-Bit ISA Slots
- 101-Key Keyboard, MS Mouse & Joystick
- MS-DOS 6.2 & WFW 3.11
- Choice of Family PC Software
- EPA Energy Star Compliant

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### 4DX2-66* FAMILY PC

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### P5-66

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- PCI Local Bus Graphics with 2MB
- Double-Speed CD-ROM
- 3.5" Diskette Drive
- 15" Color CrystalScan Monitor
- Desktop Case
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- AnyKey Keyboard & MS Mouse
- MS-DOS 6.2 & WFW 3.11
- Choice of Application Software

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- 16MB RAM, 256KB Cache
- 540MB 13ms IDE Hard Drive
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- High-Performance PCI Local Bus Graphics with 2MB VRAM
- Double-Speed CD-ROM
- 16-Bit Sound Blaster-Compatible Sound Card & Yamaha Speakers
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RANT CONTROL

## Chicago Droolin'

Your March cover ("Inside Windows 4.0," page 124) rants and raves about a product that isn't even expected to ship until the end of the year—or who knows when, given Microsoft's record for releasing software on schedule. Windows 4.0 could have as many bugs in it as my kitchen cupboard does after I've left the sugar jar uncovered. No doubt it will devour humongous chunks of hard-drive real estate and require gobs of RAM—we're supposed to start drooling already?

Karlheinz Groeger
Novi, Michigan

### Main Course: Windows 4.0

Like thousands of other PC users, I eagerly await the release of Windows 4.0. Your March cover article jumped out at me from the magazine rack. Hey, how could I pass it by when I'm starved for information about this mysterious new operating system that does everything but take out the trash? Thanks for the most comprehensive, impartial, fact-filled report to date. My appetite's suppressed, at least temporarily.

Tor Osthed
torosthed@aol.com

### Wake Up and Smell DOS 7

If I weren't sensitive to the trade media's dependence on advertising revenue, your Windows 4.0 article might have made me nervous. Are you really so far removed from the end-user world that you're not aware of the burgeoning rediscovery of the DOS prompt? DOS 7 will be the product that kills OS/2, NT, and anything else that can't boot from a 3.5-inch floppy.

John Winship
Everett, Massachusetts

### Don't Breathe the Vapors

Thank you for once again leading us down the primrose path of vaporware. After reading Ed Bott's article on Windows 4.0, I was so convinced that my current system didn't cut the mustard, I decided to pull the plug and wait for the arrival of this utopian software.

Richard Efruss
Boca Raton, Florida

### Fawning Ghostwriter

Apart from the obvious obeisance to the Microsoft public relations department, the March cover story is simply insulting to any thinking person's intelligence. Bill Gates could not have written a more fawningly insipid article.

Anthony Cagle
Seattle, Washington

**MORE FAWNINGLY INSIPID?** You might get a chance to find out: In April, Gates received a $2.5 million advance from Penguin USA to coauthor a book on the proposed Information Superhighway. **JZ**

### Appalling Hosannas

I was appalled by your breathless hosannas to an unreleased bit of software (Windows 4.0). I repeatedly looked to the top of the page to see whether there was "advertisement" written there. Other publications treat their advance peeks at Windows 4.0 with reasonable calm, offering insights into virtues as well as drawbacks. You'd never know about any drawbacks reading your review.

Bruce Grant
Toronto, Canada

### Relational Data

Your feature on Windows 4.0 was very Gates-ish. Are you guys related?

Joseph Veverka
Brookfield, Illinois

**BILL AND I WERE BORN** less than 30 miles and 30 days apart, but I'm sorry to say we probably weren't separated at birth or I'd be calling my lawyers right now. Our preview of Windows 4.0 certainly wasn't a review—there's nothing to review yet. But if history is any gauge of the future, planning for Windows 4.0 is like planning for retirement—if you wait too long, it will be too late. **EB**

### Sincerest Flattery

In your recent article concerning Windows 4.0, I counted five references to it being "just like OS/2." You also write, "OS/2 2.1, despite a few rough spots, has the most sophisticated approach to tracking files and file attributes." I have one question to ask: Where was the 12-page write-up on OS/2 2.1 when it was first released? Your article claims that Windows 4.0 is the most promising operating system, when in fact it seems that OS/2 beat Microsoft to the punch a long time ago. I'm sticking with OS/2.

Denny Kernan
Stamford, Connecticut

### Any Color, Long as It's Black

I could not believe the number of times your article stated, "Like OS/2, Windows 4.0 will do this. . . ." Or, "Like OS/2, Windows 4.0 will do that. . . ." With the number of PC systems shipping DOS and Windows preinstalled, such a huge installed base isn't surprising—consumers aren't given any choice. It's like forcing 90 percent

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VICTOR PALMA
LACEY, WASHINGTON

## OS/2's Present Poise

Considering the system resources needed to run Windows 4.0 and OS/2, it's hard to believe anyone would bother waiting for the vaporware of the decade. OS/2 is here now and is poised to be the operating system of the future.

MATTHEW JANULEWICZ
SAN DIEGO, CALIFORNIA

## Knee-Deep OS Hoopla

What is all the hoopla about an operating system that might be released in 1995, when OS/2 has the same features available today? Am I doomed to listen to another year of hype about an operating system that doesn't exist?

MARCUS COX
FREMONT, CALIFORNIA

**LONGTIME READERS** will recall our extensive OS/2 coverage since Version 2.0 was released in early 1992, including a comprehensive, 8-page review in May 1992 ("OS/2 2.0 Does the Job," New! page 48). In addition, I gave a 6-page thumbs-up to OS/2 for Windows in our April 1993 issue ("Techniques of the OS/2 Masters," page 208).

When Windows 4.0 ships, we'll review it fully and fairly, just as we'll review each new release of OS/2. You'll vote with your wallets on which operating system really has the brightest future. **EB**

## Usable Words

I thoroughly enjoyed the face-off in your March issue between Microsoft Word 6.0 for Windows and WordPerfect 6.0 for Windows ("Perfect Words," page 160). Focusing on real users as a usability test base helps readers get a true evaluation of the products being reviewed. However, you failed to mention WordPerfect's QuickFinder

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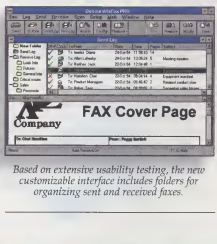


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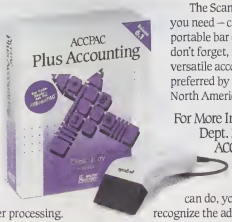


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JERRY STEWART
PROVO, UTAH

## I'll Go Wherever Yugo

I disagree with your rating WordPerfect 6.0 for Windows over Microsoft Word 6.0 for Windows. WordPerfect is just a word processor; Word is a writing tool with unparalleled features like Outline Mode. Your review's negligence is the equivalent of arguing that a Yugo gets better mileage, has cheaper parts, and takes up less parking space than a Cadillac, therefore the Yugo is better.

MARK LAMENDOLA
OWENSBORO, KENTUCKY

## Send It Cellular

Thanks for your review of cellular modems ("Cellular Modems: Please Hang Up and Try Your Call Again," March 1994, New! page 86). Because of manufacturers' publicity, the expectation of cellular data communications has been set too high. Users have to be taught that although the idea of sending data via modem isn't new, the idea of sending it over cellular lines is.

OLLI-PEKKA LINTULA
HELSINKI, FINLAND

## Picky, Picky

I sat at the breakfast table this morning, preparing to enjoy your magazine and a bowl of cereal, and there he was—Henry Kissinger with his finger up his nose. I may never look at Logitech or your magazine the same way again. Thanks a lot!

MICHAEL W. RADFORD
LILBURN, GEORGIA

**JUST IMAGINE** what his left-mouse button looks like. **PS**

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JILL GRIEVESON
GLASTONBURY, CONNECTICUT

## TV Guise

Every time I see a computer on a TV show like *Melrose Place* or *Beverly Hills 90210*, it's some type of Apple. Why?

JEFF EDWARDS
ODESSA, TEXAS

**GOOD LOOKS** go a long way in Hollywood, especially when you don't have to turn them on. **JL**

## Corrections

- In May's "Decoding DoubleSpace in DOS 6.2" (Help, page 174), we stated that DOS 6.2 had not corrected the problems in DoubleSpace. In fact, all reproducible problems are gone.
- The correct phone numbers for Insight Direct ("Pennywise Pentiums," May, page 104) are (800) 755-3875 and (602) 902-1176.
- The April Windows column ("The Motto of Scouts and Notebook Owners: Be Prepared," Help, page 188) should have explained that by default, SmartDrive 5.0 in MS-DOS 6.2 installs with delayed write caching turned off. SmartDrive 4.1 in MS-DOS 6.0, however, does ship with delayed write caching turned on.
- The correct phone number for ROM BIOS Upgrades (Q&A, April, page 224) is (800) 766-2467.
- In our March word processor face-off, ("Perfect Words," page 160), the total score for WordPerfect was 86.9. This change does not affect its ranking.

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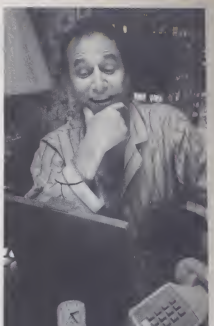

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MS-Windows 3.1, & TabWorks
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The power of a desktop, the convenience of a notebook. Lets you work however and wherever you want—with a keyboard or a pen. Features Compaq MaxLight™ 9.5" Monochrome VGA backlit display, and power conservation features.

**$2,049**
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### Concerto™ Features:

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◆
4MB RAM
◆
120MB Hard Drive (250MB available)
◆
3.5" Diskette Drive
◆
Integrated High-Resolution Digitizer
with cordless, intelligent pen
◆
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◆
2 PCMCIA Type II slots (or single Type III)
◆
Preinstalled MS-DOS 6.2, MS-Windows for
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MS-Excel, InkWare NoteTaker, and TabWorks
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intel inside

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The Compaq 3-Year Warranty†

# MAY BE ON THIS PAGE. IT, CALL FOR HELP.

## *Compaq ProLinea MT*

*MT 4/33s* $1,849 *Or $66 per month**

*MT 4/66* $2,499 *Or $89 per month**

Minitower case with EasyAccess side panel has five expansion slots and five drive bays for superior expandability. Just add options like a fax/modem, tape drive, or CD-ROM drive. Upgradable to Pentium™ technology.

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◈
Local Bus Video with 1MB
◈
14" SVGA Color Monitor (1024 x 768)
◈
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***Preinstalled Multimedia Solution Paq available.***

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◈
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◈
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◈
Local Bus Video with 1MB
◈
14" SVGA Color Monitor (1024 x 768)
◈
Preinstalled MS-DOS 6.2, MS-Windows 3.1, and TabWorks

***Preinstalled Multimedia Solution Paq available.***

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An ideal choice if you're looking for excellent performance at an affordable price. The all-in-one styling saves desktop space and makes set-up as simple as plugging the unit in. TabWorks, a Compaq exclusive, is preinstalled for greater ease of use. Network-ready and ideal for peer-to-peer communications. $1,249 *Or $45 per month**

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◈
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◈
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◈
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◈
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◈
Energy Star Compliant
◈
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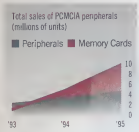
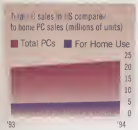
# Pulse

## CD-ROMs Migrate to IDE, 64-bit Graphics Cards




**Credit-Card Add-Ons:** PCMCIA cards forge ahead this year, riding the rising sales of portables. Now if only the prices of the cards would come down. . . .




**Work at Home:** Of all home PCs sold in 1993, 64 percent were 486s, says Intel. The company expects about 5.5 million PCs to sell for home use in 1994.

**Online Frenzy:** Forrester Research expects U.S. single-user subscriptions to online services to jump 45 percent this year. Online spending is likely to rise 26 percent in 1994.

POWERPC ALERT

# The Pit and the Pentium

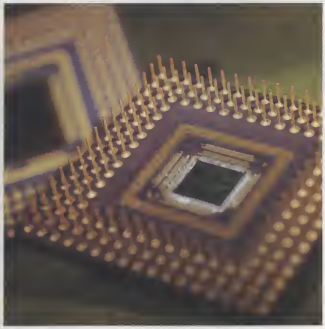
PowerPC is Intel's worst nightmare. All of the hype surrounding the Apple/IBM/Motorola CPU cabal has our favorite monopolist rushing its Pentium and DX4 processors out months early—and throwing $150 million into advertising—just to make sure your eyes don't pendulum over to its RISC-based competitors.

Go figure. Intel owns 86 percent of the processor business, and RISC systems won't have a crack at Intel-centric Windows buffs until Motorola ports Windows NT to the PowerPC. That's a year or more away, estimates Michael Slater, publisher of the *Microprocessor Report*, and even then, running Windows will throttle down the PowerPC to something like a slow 486.

But if you don't buy a PowerPC tomorrow, you can bless Motorola and IBM and Apple for forcing the prices of Intel's brand-new 3.3-volt 486 DX4s and Pentiums southward today. We detail some prematurely cheap DX4 and Pentium systems in this month's New! section (see "Corvette Speed at Chevette Price," page 55), and there's plenty more coming.

Our Winstone real-world application tests on the early entrants are conclusive: The 90MHz Pentium unquestionably delivers more bang for your buck than the DX4. With nearly identical P90 and DX4 versions of Dell's Dimension XPS, we found the P90 has substantially more power than a DX4 for just a little more cash—and that's not a bad deal.

And you can now kiss the 60MHz Pentiums goodbye—



**Get 'Em While They're Cheap** DX4s and fast Pentiums are going like hotcakes, thanks to Apple and the PowerPC.

PHOTOGRAPH BY CHRISTINE ALICINO

## UPDATES Best Bets and Bargains

**TWO NEW WOROPERFECTS**
WordPerfect 6.0b and 5.1+ for DOS are faster and 25 new macro commands stronger. Plus, they make fax setup easier. ($495, WordPerfect Corp.; 800-321-4566.)
*Reader Service No. 626*

**SLOW AND STEADY WINS OATABASES**
This summer, Borland plans to release dBASE for Windows (finally) and dBASE 5.0 for DOS. Microsoft is revving Access and FoxPro. Meanwhile, Lotus promises a new Approach.

**ONLINE OUTLINE**
Quirky outline-based PIM Ecco 2.0 gets new network features, with a group scheduler, file sync, and links to WinFax Pro. Call Arabesque at (206) 869-9600 for current pricing.
*Reader Service No. 627*

**PRICE PROTECTION**
Buy Novell's NetWare any time before year-end and get free updates until March 31, 1995—on CD-ROMs if you want. Contact Novell at (800) 638-9273 or (801) 429-7000.
*Reader Service No. 628*

## Run Better, Stronger, Faster, and DSPs Finally Ship

the DX4s run just about as fast but are priced anywhere from $200 to $3,000 lower. Bottom line: Take advantage of Intel's PowerPC-anoia. Pick up a DX4 or P90 at an 800 number near you soon.

**CD-ROM without Tears**
Is your CD-ROM drive a bear to install? Does it run like a snail on stilts? You can blame the CD-ROM drive manufacturers, which haven't been able to shake off SCSI or proprietary interfaces for something more efficient—that is, until now.

A new IDE protocol will let your CD-ROM drive hook into the standard IDE connector that's on your motherboard. Expect IDE CD-ROM drive upgrade kits soon, as well as a new wave of systems that come preloaded with IDE CD-ROM drives.

**A Wider Data Highway**
Those 32-bit graphics adapters are moving to the back of the bus. The latest superfast video cards, such as Number Nine's #9GXE64, have a 64-bit data path and other tweaks to push more colors at higher resolutions and higher refresh rates on your monitor, without slowing down Windows. Look for our hands-on reviews in New! next month.

**Better Late than Never**
Only 18 months later than expected, multifunction digital signal processors (DSPs) are coming to your ISA slot. The first programmable data/fax/answering machine/sound boards to appear—Spectrum Signal Processing's $349 Spectrum Envoy (see New! May, page 76) and Best Data Products' $299 Advanced Communication Enhancement—are based on an IBM/Texas Instruments Mwave DSP.

### Stay Wired via Wireless

Palmtop, beeper, and news service: **HP 100LX.** Sign on to HP StarLink and a wireless service downloads your messages and the latest news, sports, weather, and financial information from Dow Jones and Reuters news services. Different levels of StarLink services start at $10.95 per month, and there's a onetime $229 charge for a PCMCIA Motorola NewsCard receiver.

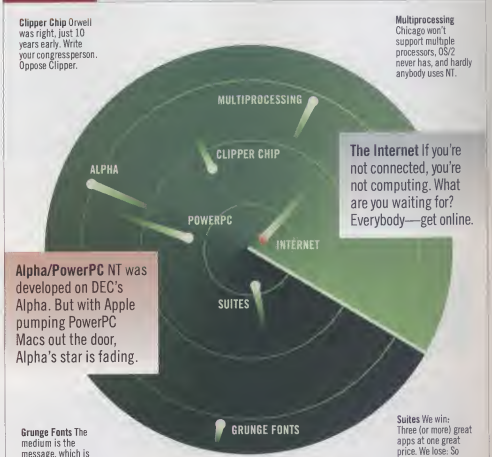
Hewlett-Packard; 800-917-5485; *Circle Reader Service No. 635*

### Software Prices

| Product | List | Best |
|---|---|---|
| MS Office 4.2 | $750 | $457 |
| *Computer Discount Warehouse (800) 337-4735* | | |
| Lotus SmartSuite 2.1 | $795 | $443 |
| *Computer Discount Warehouse (800) 337-4735* | | |
| Borland Office 2.0 | $595 | $359 |
| *Egghead (800) 344-4323* | | |
| MS Excel 5.0 | $495 | $319 |
| *Dustin (800) 477-3878* | | |
| Lotus 1-2-3 4.0 | $495 | $294 |
| *Computability (800) 558-0003* | | |

*Reader Service Numbers:* Computer Discount Warehouse *629*; Egghead *630*; Dustin *631*; Computability *632*

### RADAR CONTACT! **INTERNET, POWERPC** CLOSING FAST




**Clipper Chip** Orwell was right, just 10 years early. Write your congressperson. Oppose Clipper.

**Multiprocessing** Chicago won't support multiple processors, OS/2 never has, and hardly anybody uses NT.

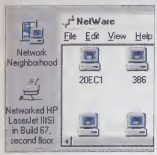
**The Internet** If you're not connected, you're not computing. What are you waiting for? Everybody—get online.

**Alpha/PowerPC** NT was developed on DEC's Alpha. But with Apple pumping PowerPC Macs out the door, Alpha's star is fading.

**Grunge Fonts** The medium is the message, which is just as well when you can't read the text.

**Suites** We win: Three (or more) great apps at one great price. We lose: So much for cross-vendor standards.

**What's on the scope?** If it's near or moving toward the middle, pay attention to it. If it's moving off the screen, forget about it for now. Your time is too valuable.




## Chicago Watch: LAN Matters

We've seen Windows 4.0 on a LAN, and we like it. Among the benefits: Telecommuters have **dial-in access** and file synchronization . . . There's **instant mapping** to network drives from the new File, Open common dialog box . . . You will be able to mount network drives by simply dragging and dropping.

Microsoft's throwing in its own **NetWare client** . . . Not to mention **NetWare server** functionality in the form of pass-through security (although you'll need a real NetWare server on the LAN to serve up security authorization).

There will be no "Chicago for Workgroups." All copies will have built-in **peer-to-peer networking** . . . Network administrators can configure users' desktops with ease.

And **TCP/IP** is included. So far so good. Now, when's this thing shipping?

*Contributors to Pulse:*
MIKE HOGAN, GEORGE MEIER, RAPHAEL NEEDLEMAN. EDITED BY MATTHEW J. LAKE

## No Pain, Net Gain

Want to get your office up on the Internet? You could use dial-up modem connections and learn the meaning of the word *slow*, or install your own Unix host and lose the concept of weekends. But if you crave high-speed access without the drag of network node management, check out Performance Systems International's (PSI's) **LAN-ISDN Internet service.** At $400 a month, plus ISDN charges (and a $500 one-time setup fee), it's not cheap. But it gets all your LAN users online to the Internet at a breakneck 64 kilobits per second. Sign up before September 30, and PSI throws in the ISDN router you need to hook it all up. **Work-at-homers**, take heart: There's a lower-priced, single-user service in your future.

PSI: 800-827-7482 or e-mail info@psi.com; *Circle No. 636 on Reader Service Card*

## SOFTWARE SALESWIRE

**THE BIG FIFTEEN** BEST-SELLING PROGRAMS

| BUSINESS APPLICATIONS | Vendor | Price | Comments | FEB | MAR |
|---|---|---|---|---|---|
| Excel 5.0 for Windows | Microsoft | $495 | Scenario Manager plus analytical tools. | 2 | 1 |
| Word 6.0 for Windows | Microsoft | $495 | AutoFormat offers 20 predesigned styles. | 1 | 2 |
| WordPerfect 6.0 | WordPerfect | $495 | Forty-five forms for faxes and newsletters. | 10 | 3 |
| PowerPoint 3.0 | Microsoft | $495 | Embed graphics and data from other apps. | 3 | 4 |
| Lotus 1-2-3 4.*x* | Lotus | $495 | Cursor symbols provide instant feedback. | 6 | 5 |
| **UTILITIES** | **Vendor** | **Price** | **Comments** | **FEB** | **MAR** |
| MS-DOS 6 | Microsoft | $129 | Recover deleted files with Undelete. | 1 | 1 |
| Windows 3.1 | Microsoft | $149 | Access your 16MB of extended memory. | 3 | 2 |
| QEMM 7 | Quarterdeck | $99 | Better Pentium and notebook handling. | 2 | 3 |
| Norton Utilities 7.0 | Symantec | $179 | Data recovery for damaged DOS 6 files. | 5 | 4 |
| Stacker 4.0 | Stac Electronics | $149 | Now with 2.5-to-1 compression. | - | 5 |
| **PERSONAL PRODUCTIVITY** | **Vendor** | **Price** | **Comments** | **FEB** | **MAR** |
| TurboTax 1993 | Intuit/ChipSoft | $69 | A popular program near mid-April. | 2 | 1 |
| Quicken 3.0 | Intuit/ChipSoft | $69 | Automatic entry of recurring expenses. | 1 | 2 |
| Print Shop Deluxe 1.2 | Broderbund | $49 | 3,500 headlines to jazz up presentations. | 9 | 3 |
| CompuServe Membership Kit | CompuServe | $49 | Save messages off-line for later delivery. | 6 | 4 |
| Quicken 7 for DOS | Intuit/ChipSoft | $69 | 14 investment performance measures. | 3 | 5 |

Software Saleswire is compiled by G. Meier, Inc., once each month after gathering ranked-order sales information supplied by the following software industry sources: 800 Software, ABCD Distributors, American Software, Babbages, Baker & Taylor Software, CompUSA, Computability, Computer Discount Warehouse, Corporate Software, Dozen Discount Software, Egghead Discount Software, Electronics Boutique, GameFA, GTB, Ingram-Micro, Joshe Distributing, Kerfit, Lucas Int'l, Merisel, Multiple Zones, Navarre, PC Connection, Software Research, Software Spectrum, Software, Etc and Waldensoftware. They represent sales through less of the sources of resellers and more than 50 billion of software sales. A weighting system is applied to each entry based on three factors, the entry's position in the individual chart, the power of the contributing source based on annual gross sales, and the relative strength of a source in a given category of software. All prices are suggested retail and are subject to change.

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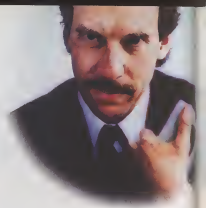
# Paul Somerson



# I-Way or Our Way

Everywhere you turn, every newscast, newspaper, magazine, and radio show is saturated with it . . . The Databahn. The Convergence. The I-Way. They all act as if they've stumbled onto the Secret of the Universe. Digitilliterates who wouldn't know an RJ-11 from a 7-11 suddenly babble on about webs and nets as if these were the One True Path. Just look at the sappy road images they trot out. Enough to make a country-and-western singer puke.

Everything is "an on-ramp to the information highway." "A detour." "A rest stop." "A tollbooth." "A dead end." "A rut." "A fast lane." "A U-turn." They've turned it into the Information **SUPER HYPEWAY.**

Even those of us who can warble a modem handshake tone the way most people hum ad jingles are getting caught up in this silly hucksterism. "Log on! Get wired! Print is dead!" Get serious.

Want to try the Internet yourself? Get ready to wrestle with TCP/IP, SLIPs, PPPs, FTP, UUCP, WAIS, Archie, Veronica, assorted daemons, and endless **TYPOGRAPHIC-NIGHTMARE** DNS addresses. And a little pidgin Unix wouldn't hurt.

Besides, plugging in is the easy part. Ever try to make productive use of this stuff? We don't want to **SURF** the Internet. We don't want to **GRAZE** on far-flung databases. We're running businesses here. We'd like to *distill* data, not bathe in it.

There's just too much of it out there. It's information **OVERLOAD.** And frankly, how much of it can you trust? What you really need is a guide to it all that respects your time. One that's totally authoritative and accessible. One that knows exactly what you want and delivers it without burying you in fluff.

When it comes to information about PC products, we plan to be that expert guide. You're holding the **BRAND-NEW MAP** in your hands right now.

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We'll be reviewing many more products in each issue by boiling every story down to its data-rich core, and displaying the most important information graphically. Brand-new features like our up-front **PULSE** section will give you instant access to timely data you can't get elsewhere. We'll even show you the hottest new products, categories, and technologies appearing on our **RADAR** scope.

We've also revamped the **HELP** section to kick your productivity painlessly into high gear. And next month we'll add a section identifying futuristic high-tech gizmos you (and we) **JUST GOTTA HAVE.**

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PHOTOGRAPH BY JAMES McGOON

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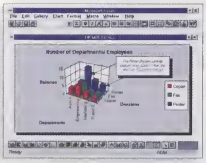


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# Ed Bott

# CeBIT Revisited

The next person who gripes about Fall Comdex should be sentenced to a week at CeBIT. In brand-new shoes. Without a map. Comdex, with 2,200 exhibitors and about 150,000 attendees, is the largest computer show in the United States. Next to CeBIT, though, it looks like an intimate get-together among a few friends.

CeBIT, with 5,500 exhibitors and 650,000 attendees, is not just the largest computer show in the world—for one week in mid-March, it's among the largest cities in Northern Europe. Held in Hannover, Germany, where the weather turns from sunshine to sleet to snow flurries every hour or so, CeBIT is a snapshot of where computing is going.

Slogging through the 18 halls in the Hannover fairgrounds and picking out the worthwhile new products is not for the faint of heart. Fortunately, exhibit halls are organized by category, an intelligence that's only partially realized at Comdex. There were a thousand stories at CeBIT this year, but three stood out.

**PowerPC vs. Pentium** Everybody loves a dogfight, and this one was the best Europe has seen since Baron von Richthofen did his last barrel roll over Northern Germany. Apple introduced its Windows-compatible Power Macs at CeBIT and promised an aggressive publicity campaign to convince Windows users to switch. The new RISC-based systems are awesomely fast, especially on graphics applications like Photoshop, but Apple needs to make a few changes before it wins the desktops of Windows users.

The changes could start with the demos: The Mac-head who showed me the Power Mac 601 couldn't answer simple questions about the system's Windows emulation. Like: How do you click the right-mouse button using the Mac-style one-button rodent? (Answer: Use a wrist-twisting keyboard combination.) And it didn't take a Swiss watch to tell that the Windows screens were moving about as fast as a French customs agent.

Meanwhile, you couldn't go 20 feet in any direction from the Apple booth without seeing a system with one of the new Intel chips inside. There were 100MHz clock-tripled 486s everywhere. And for every five DX4s there was at least one new 90MHz Pentium. The most impressive exhibit, buried in a corner of Novell's booth, was Advanced Logic Research's latest technology demonstration: a multiprocessing machine stuffed with *four* 100MHz Pentiums and running Windows NT. Who cares that NT's multiprocessing version runs on only two CPUs?

**Infobahn** You and your BMW can tool along at 200 kilometers per hour on Germany's autobahn, but its digital equivalent is strictly the slow lane. In fact, European telecommunications is a mix of the brilliant (easy access to integrated services digital network lines), the bureaucratic (different regulatory bodies for every country), and the bizarre (telephones with hallucinogenic designs that look like props from the movie *Brazil*). Just trying to get a dial tone will have you pulling your hair out.

The leading modem makers were showing V.Fast Class modems that run at rocket speeds. But none has been approved by European telephone regulators yet. You could (wink wink, nudge nudge) buy an unapproved modem and just plug it in. But for now, at least, the North Americans are in the driver's seat.

**CLOCK-TRIPLED** *100MHz 486s everywhere . . . multiprocessing* **PENTIUM** *from ALR running Windows NT . . .* **V.FAST** *modems that fly . . . And suites,* **SUITES,** *and more suites*

**Groupware** The days of the standalone desktop application are dead. Software suites are partly to blame. At CeBIT, Microsoft's Office drew huge crowds. The Lotus SmartSuite demo was SRO daily. And the Borland/WordPerfect/Novell virtual Office/Suite was popular even though its three pieces were being shown separately by three different groups in three locations in Hall 2.

But the real action was underneath those familiar desktop applications, in messaging-intensive collaborative tools like Lotus Notes and WordPerfect Office. Notes drew a curious reaction from Lotus's competitors: Most of those I spoke with scoffed at its value, then demonstrated how they were adding Notes compatibility to their next version.

Meanwhile, a hundred yards away, demos of WordPerfect Office made a convincing case that it is a serious threat to be the most important network application of the decade. WordPerfect Office today is a hodgepodge of pieces. But with Novell's backing, look for WordPerfect to tie it into a cohesive package that handles mail, scheduling, and workflow automation. Lotus and Microsoft have every right to be worried.

There were other fascinating stories at CeBIT, like Zenith's $999 plug-and-play Z-Stor file server or Sun Microsystems' infrared technology. In fact, there was more news at this year's CeBIT than at any Comdex I can recall. If you only have the budget for one computer show next year, choose the one without slot machines.

PHOTOGRAPH BY JAMES McDOON

# *PC Magazine, PC/Computing & Computer Shopper* All Agree...

# The ZEOS® Pantera™ Is The #1 Pentium PC.

We could fill this page with self-indulgent comments about how technically superior our Pentium processor-based systems are, how they perform far better than the competition, how great a value they are–and so much more. But why listen to us, the manufacturer, when top editorial experts at three leading publications said the same thing–and far more eloquently.

## PERFORMANCE:

"In terms of performance, the Pantera-66 left little to be desired... this machine scored high consistently and laid claim to no low scores whatsoever."
*PC Magazine,* Editors' Choice, April 12, 1994

"A rocket...scorching performance."
*PC/Computing,* BEST, May 1994

"...one of the more consistent performances in our suite of tests."
*Computer Shopper,* Top Choice, April 1994

## VALUE:

"ZEOS Pantera-66 combines quality features, good price, and high performance..."
*PC Magazine,* Editors' Choice

"A standout in speed and value... we suggest you spend your money on this machine–it offers the best value of any system we tested...this is a deal you simply can't pass up."
*PC/Computing,* BEST

## THE EXPERTS CONCLUDE:

"...the most desirable computer in the group."
*Computer Shopper,* Top Choice

"Rocket-fast performance and a great price make this our favorite Pentium of the lot...there's no doubt which machine you should choose: ZEOS's Pantera-66."
*PC/Computing,* BEST

OK, so maybe we were a little indulgent, but that's what the experts said–and they all agree that the ZEOS Pantera is the BEST. It's the Top Choice. It's the Editors' Choice. Make it your choice. Call a ZEOS Systems Consultant today at 800-554-5218.

PC MAGAZINE EDITORS' CHOICE April 12, 1994

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# The ZEOS® Pantera™ "achieved premier status."

–*PC Magazine* Editors' Choice, April 12, 1994

PC MAGAZINE EDITORS' CHOICE April 12, 1994

PC Computing BEST

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Top computer experts at three leading publications all agree that the ZEOS Pantera is the best Pentium-processor based system available.

The ZEOS Pantera-66 earned *PC Magazine*'s Editors' Choice (April 12, 1994), *PC/Computing*'s BEST award (May 1994) and *Computer Shopper*'s "top choice" (April 1994). These prestigious awards all add up to one thing–ZEOS computers are your #1 choice.

Don't settle for less. The ZEOS Pantera has it all. *PC/Computing* concurs: "Hot performance, room for expandability, and a low price make this system our top choice."

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yes It runs with NetWare

## PURE PERFORMANCE

*PC Magazine* said: "ZEOS Pantera-66 combines quality features, good price, and high performance.... A consistently above-average performer on all our benchmark tests...."

*PC/Computing* agrees: "Rocket-fast performance and a great price make this our favorite Pentium of the lot."

The ZEOS Pantera received the highest marks on the important Graphics WinMark and Disk WinMark tests run by *PC Magazine.* In fact, its Disk WinMark surpassed the next closest competitor by 35 percent!

What makes the Pantera fly at supersonic speeds? A ZEOS designed motherboard with exceptional features such as a hot new integrated PCI Local Bus IDE Controller (supporting up to four IDE devices) that, as *PC Magazine* said, "pushes disk access into new territory."

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SERVICE & RELIABILITY PC MAGAZINE READERS' CHOICE

ZEOS offers you all this and more. It's easy to see why the Pantera is an award-winning system. It's the Editors' Choice. Make it your choice. As *PC/Computing* said, "there's no doubt which machine you should choose: ZEOS's Pantera...this is a deal you simply can't pass up." Call your ZEOS Systems Consultant now at 800-554-5218.

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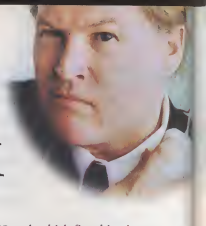
**Circle 248 on reader service card.**

# John C. Dvorak



# The Laugh Track

It was a weird dream. I was the producer of a television sitcom called *The Craig and Mr. Bill Show*, based on the real-life adventures of neighbors Craig McCaw (McCaw Cellular) and Bill Gates (Microsoft). I was going over the script with the actors. Dick Smothers was playing Craig McCaw and Harry Anderson was playing Bill Gates. I can recall this one episode in particular. . . .

[*Knock on door. Bill Gates goes to door, opens it, and sees his neighbor from down the street, Craig McCaw.*]

**Gates:** Craig! Knocking? You know that on sitcoms you're supposed to just barge in.

**McCaw:** But then I couldn't say, "What? Still no butler?!"

[*The two laugh together.*]

**Gates:** Come on in buddy, let's have a soda pop.

**McCaw:** Great. I can always use a good hearty glass of pop.

[*They go into Bill's office, and Craig sits down as Bill comes in with two diet Cokes.*]

**McCaw:** So Bill, I've been thinking. We've got to make some headlines. I'm getting bored.

**Gates:** After that $13 billion deal you did? Cool deal, man!

[*Gates stands up and holds up a palm for a high five. McCaw takes a shot at it and misses.*]

**Gates:** Missed again?

**McCaw:** You moved.

**Gates:** Did not.

**McCaw:** Did too.

**Gates:** Not. Not. Not. Not. Not. Not.

**McCaw:** OK, OK!

**Gates:** So what's the plan to end your boredom?

**McCaw:** Look, we've been neighbors for a long time. Let's do a deal together. I've come up with a great idea. You know that Iridium project by Motorola where they launch the 66 satellites to link the globe? Apparently some other players are going to do the same. With government into this Information Superhighway crap, who knows what kind of serious money we can sucker out of Uncle Sam.

**Gates:** Or what about the investment capital community? From my experience they don't have a clue. They listen and believe anything we say. And it's like Lucy with the football. Over and over and over she tricks Charlie Brown. It's phenomenal.

**McCaw:** Lucy? Charlie who?

**Gates:** Never mind. I like this idea.

**McCaw:** I even have a guy to run the thing. It's a no-brainer. Perfect for us. We can come up with a cool name for the company and make an announcement and then sell shares. Make it a 20-year project or something like that. It would be great. I'll bet we can do the most outrageous thing just based on our names.

**Gates:** You know, I think you're right. Of course, it must be computer-related. These satellites have to be used for data. Otherwise people will wonder what I have to do with it.

**McCaw:** Right. Besides that, the public is hot for computers and technology. Everyone will buy into it, whatever we do! We can use them to send TV programming later! Har!

[*Gates holds his palm high for another high five, and this time McCaw nails it! Gates nearly falls over backward from the impact.*]

*Two* **TITANS** *of technology want to send up 840* **SATELLITES** *. . . Idea is endorsed by* **AL GORE** *. . . Our heroes laugh all the way to the* **BANK** *. . . What wacky plan is next?*

**Gates:** Hey, that high five thing is neat when it works. Anyway, so we're going to launch a network of datacomm satellites. How many?

**McCaw:** I dunno. Never asked anyone. Motorola says it can span the globe with 66. They've been in the business. Maybe we should just double it. Make it 120.

**Gates:** Doubling it makes it 132.

**McCaw:** Really? [*starts counting on fingers*] Yes, I knew that.

**Gates:** Anyway, screw that. Let's make it 500! That should get some attention.

**McCaw:** Let's top it. [*looking at clock*] It's 8:40 right now. Let's make it 840 satellites, and the number will be our little joke. Ha ha ha.

[*They both try to do a high five, both miss and catch themselves. They make contact on the second try, knocking each other over.*]

**Gates:** All right!

[*The scene switches to the next day. The two of them are at a breakfast table together reading the same newspaper. The camera zooms in (over the shoulder of Gates) to an article in which Vice President Gore says the administration will support the 840-satellite plan. The camera moves back. The two drop the paper. Big smiles erupt on both faces. They simultaneously clench their fists and shout, "Yes!" They stand and deliver a fabulous high five, knocking each other to the floor.*]

After I woke up, I realized that this show is not such a bad idea. Maybe I can even sell it to one of the networks. *The Craig and Mr. Bill Show* will provide hours of family-oriented, good, clean fun. Along with Al Gore's naive approval of every wacky plan Craig and Bill dream up, the next few years will be a laugh riot!

PHOTOGRAPH BY JAMES McGOON

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# Gil Schwartz

# It's Game Time!

Don't go 'way. It's time to play *Consolidation*—the game all American computer companies are playing, the game where everybody's a winner—particularly the strong. It's rough and tumble, dog eat dog, but hey, how else are you going to keep that stock price in the air when the market for your core product is 100 percent saturated and Wall Street is screaming for double-digit revenue growth? You . . . *consolidate*! Or die!

Here's how it works. You folks in the red T-shirts are from Micromacro—and you should be proud! Proud, I tell you! Because you know what? You're the best darned programmers of interstitial desktop fuzzy prognosticators in the business! There isn't a prehensile spreadsheet that can function without you. Everybody loves what you do! Give yourselves a hand! That's right! Now settle down. My, you're a feisty bunch.

Now you guys over on the other side of the studio audience are from Cyberdunk. You can feel just as fabulous about yourselves, brothers and sisters, because without you, nearly 60 percent of the computer-loving universe would be without its most popular object-based intravascular word broaster. You're the greatest. Put your hands together and pat yourselves on the back—if such a thing is physically possible. It is? Great!

Now that you're all in teams, are you confused about what to do next? Sure you are! You've got to grow, got to go, but you don't know how. So here you are, in the calm before the storm, where everybody's in one piece, knows what their jobs are and where their next paychecks are coming from! Enjoy that feeling, because you won't see its like again after you're . . . consolidated!

Are you ready? What do you mean, no? It's gone too far! You have no choice! Sooo. . . on your marks, get set, *merge!*

Isn't that exciting, ladies and gentlemen? Just watch the two groups as they meet in the center of the floor. See how the Micromacro side is just a little bit bigger, a little bit stronger. Regard how the Cyberdunkers shrink back, allowing Micromacro to move into the best strategic positions, fill all the crucial spots on the playing field. And *five, four, three, two, one! It's over! Hold your positions!*

Let's see where we stand.

First of all, we have a new, larger team dedicated to producing . . . the same two products as before? *BZZZT.*

Sorry, guys, the game just changed.

That's why, players, in the next round you're going to have to hit the following key bases if you want to pass Go, collect your paychecks, and come back tomorrow to play again.

First, you'll need to *make one plus one equal three!* What do you mean, it doesn't? Well, it better! You've gotta take what you both did before, put it into one new, gigantic pot, stir, and come up with greater value than anyone ever expected. What's that mean? It means synergy! People working together to do more things than they could apart, doing them better, smarter, faster . . . and cheaper. Cheaper? Of course! Because while you're synergizing all over the place to build new opportunities, forge alliances, and create new products and processes, you're going to have to. . . .

**DOG EAT DOG . . .**

***What's the matter, gang? I don't see you smiling! . . . Get with the***

**NEW CULTURE . . .**

***Play mean. Play lean . . .***

**BZZZT.** ***Business as usual? Pfaugh!***

*Do more with less.* Make more products. With fewer people. In fewer locations, too, to rationalize costs. That's part of the game, didn't you know that? Yes, thanks to the cost of the merger, and the effect it had on Micromacro stock (which went down, for some reason, right after the deal closed), we need to make a lot more money real quick to justify the bold, strategic action and also not lose our shirts.

What's the matter, gang? I don't see you smiling! That's *bad.*

'Cause while you're working harder than you ever have before, you've gotta keep that beamish grin on your faces. Why? Because in the new consolidated environment, the winners always *get with the new culture!* This is especially difficult for you kids in jeans who used to work for Cyberdunk, I know, since now you've got to wear those neckties and official beanies every day. You don't want to carry cellular phones. You don't want to cut your ponytails. But get with the program! Either you're on the bus or you're off it.

You want to get off it? I thought not!

Play hard! Play mean! Play lean! Get yourself in fighting shape and stay there, because next week, guess what? Omnikomp is coming in to match its capabilities with yours and see which of you can eat the other before the next round is history.

I'm sorry to say that's all the time we have for today. Be back tomorrow when those who are left continue to play our game. The rest are invited to, well, quite frankly, get out of here! Sure it's tough. But that's . . . *Consolidation!* And what's the alternative? Business as usual? Pfaugh!

We'll be right back after this word from the new Novell.

PHOTOGRAPH BY JAMES McGUIGAN

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*- CHIP Magazine, Germany, March, 1994*

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**BRAVO LC** *Intel DX4/100,486DX2/66, 486SX2/50, 486SX/33, 4 ISA slots including 1VL slot, 5 drive bays, Pentium OverDrive upgradable.* **BRAVO LP** *Intel 486DX2/66, 486SX2/50, 486SX/33, 2 ISA slots, 3 drive bays, Pentium OverDrive upgradable.*

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# New! Microsoft Access 2.0

# Two-Point-Oh, What a Release It Is!

So you want to develop a database application? Take two aspirin and call us in the morning. Wrestling with relational joins, managing links to external data files, slinging code to make the data-entry process idiot-proof—sooner or later even the most hardened Windows expert will start to feel that familiar throbbing in the frontal lobes.

But with the latest upgrade of Access, Microsoft packs in every pain-relief formula in the usability medicine cabinet. The witch's brew of Wizards, Cue Cards, and a carefully retooled interface is a huge success—Access 2.0 is, by far, the most usable database manager in its class. But this is no miracle cure, so when you outgrow Wizards, don't be surprised if that headache is still there.

**Thirty Wizards** If you have simple database needs, Access lets you get in and out quickly.

The Wizards work well on simple tasks but they fall short on more complex jobs. The Report Wizard, for example, lets you choose from seven predefined report types, complete with headers, footers, and data summaries. But if you want to closely position the fields, add custom typefaces and logos, or define more complex summaries, you'll discover that Access's Report Wizard has left in a puff of smoke, with a mountain of pointing, clicking, dragging, and formatting still in store for you to do.

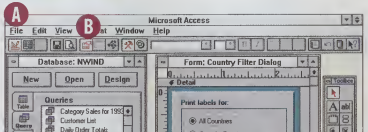
Fortunately, Wizards are not the only online helpers. A seemingly endless assortment of well-written Cue Cards offer step-by-step instructions for building tables, creating forms and reports, and even writing Access Basic code.

Elsewhere, the interface gets mostly cosmetic changes that make it slightly less difficult to use. For example, the property sheets, which define every aspect of every object in an Access database, are broken into logical subcategories, such as Data, Event, and Layout.

Some obvious interface flaws are fixed in this upgrade: You finally can sort a data-sheet view, for example, and you can highlight any rectangular block for cutting and pasting. And when you change the layout of a query, it stays changed, thankfully. But the face-lift only paints over some underlying irritations in the Access interface. Want a white background? The uninituitive value to type in the property box is 16777215—or you can use the Color Builder to type the number for you. Likewise, when specifying the Control Source for a field, Access presents a long list of queries and fields without distinguishing among them.

**Developers' Delight?** Access 2.0 is full of changes that most experienced database developers will welcome,

## OVERVIEW Access Points




**A.** Unlike Access 1.1, the **menus and toolbars** in Access 2.0 now follow Microsoft conventions.

**B.** The **Print Preview button** brings up a screen that not only lets you view output, but also lets you send data to Word or Excel with a single button click.

**C.** A reorganized database container makes it easier to distinguish between object types. The **delete query function** is distinguished by an X in the scrolling menu.

**D. Builders** are one-screen Wizards that ease the drudgery of database design by actually writing expressions and code, such as this code for an option group.

**E.** You can launch any of the new **Wizards**, including ones that build queries, mail merges, and reports, with the click of a button.

**The People's Database:** Forget everything you know about earlier versions of Microsoft's Access. Version 2.0 has something for every user, from the database dilettante to the experienced code slinger. It now offers more than 100 Cue Cards (example at left), 30 new Wizards and Builders, numerous interface improvements, right-mouse button property inspectors, context-sensitive online help, and newly added OLE 2.0 support.

**USABILITY:** *Access 2.0 is the easiest-to-use relational Windows database yet—but there's still room for improvement.*

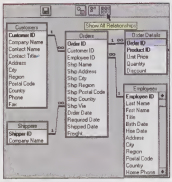
**PERFORMANCE:** *New database engine plus FoxPro's Rushmore technology equals all-around great performance.*

**TECHNOLOGY:** *A strong combination of user interface innovations and under-the-hood performance tuning.*

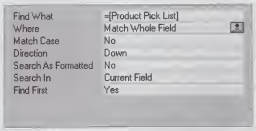
**VERDICT:** *Outstanding speed and interface improvements over the previous version, but still tricky for neophytes.*

## GUIDED TOUR

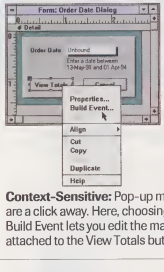
HOW TO BUILD **BETTER RELATIONSHIPS**



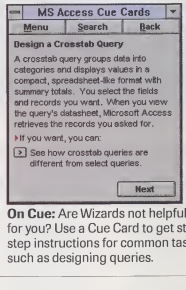

**Drag-and-Drop 'Em:** Just click to view and edit the relationships between tables.




**Macro Magic:** The macro-building dialog box lets you define all of the arguments for a given action. In this example, the FindRecord dialog box uses a series of simple lists in drop-down boxes.




**Context-Sensitive:** Pop-up menus are a click away. Here, choosing Build Event lets you edit the macro attached to the View Totals button.




**On Cue:** Are Wizards not helpful enough for you? Use a Cue Card to get step-by-step instructions for common tasks, such as designing queries.

starting with a fast new database engine and support for OLE 2.0. And for the first time, queries are processed using the Rushmore technology pioneered in Microsoft's FoxPro, the all-time database speed leader. Managing relationships is easier than ever. Access automatically joins tables with matching field names, and a graphical map of relationships helps rearrange links between different tables.

Queries are easier to create, too, especially in complicated data models, where cascading updates and deletions let changes ripple through joined tables automatically.

Reports and forms benefit from simpler links to Access Basic and a long list of properties, such as fonts that can be manipulated when a form or report is run. You can also tie event procedures directly to forms and reports, which means you no longer must store them in external modules. And Access finally supports input masks for easy-to-create, bulletproof data-entry forms.

Add it all up, and this upgrade is a must for developers who have bumped their heads against the low ceiling of Access 1.1. But the usability improvements in Access 2.0 offer only brief relief for experienced Windows users who don't have a deep understanding of relational concepts.

A new upgrade of Lotus Development's Approach, due any day now, promises to challenge Access directly on the usability battleground. In the meantime, Access will do the job—as long as you keep your aspirin handy. ED BOTT

## FILEBOX

### Access 2.0

**Minimum System Requirements:** 386 or higher, 6MB of RAM.

**Recommended Configuration:** 486 or higher, 8MB of RAM.

**Hard Disk Space Required:** 8MB minimum, 15MB when fully installed.

**The Competition:** Hot on the heels of Access 2.0 is the latest version of Lotus Approach, due out any day.

**Network Features:** Access 2.0 features enhanced structured query language (SQL) access and improved ODBC drivers for faster access to Paradox, dBASE, FoxPro, Oracle, SQL Server, and Btrieve engines. It now has more intelligent, programmable security options as well.

$495; a $30 rebate is available through July 30; $129 upgrade cost from previous versions or competitive products.
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## DX4s, P90s from Dell, Micron, Compaq, and NEC

# Corvette Speed at Chevette Price

**USABILITY:** *Dell is easy on fingertips and eyes.*
**PERFORMANCE:** *P90 is way faster than a 66MHz 486.*
**TECHNOLOGY:** *Kudos to Dell Dimension's clean layout.*
**VERDICT:** *Dell's Pentium system has it all.*

*Arrivederci*, 66MHz. High-end PC performance now starts with Intel's 100MHz 486DX4 and moves up to the 90MHz Pentium. Our tests of four first-generation systems confirmed our suspicions: To use one is to want one. Meet the fastest PCs ever.

Of course, if you mostly use your machine for running a word processor and answering e-mail, all this power is overkill. But for emerging business multimedia applications, giant spreadsheets, and future CPU-gobbling monster applications, these machines have the horsepower you'll need.

Compaq's Deskpro XE 4100 and NEC Technologies' Image 4100m systems move to the head of the 486-class thanks to Intel's clock-tripled 100MHz DX4—the latest and fastest in the 486 line. Practically speaking, they differ from 66MHz 486 boxes only in performance—they're 20 percent to 44 percent faster.

Dell Computer's Dimension XPS P90 and Micron Computer's P90PCI PowerStation, on the other hand, are full-blown Pentium PCs with PCI local buses and greater upward mobility toward as-yet unannounced processor upgrades.

High-speed architectures throughout enable these four systems to muscle through workstation-class jobs and give RISC-based system alternatives the sweats, while maintaining easy access to that huge pool of x86-based applications you've come to know and love. Dell's Dimension XPS P90 and Micron P90PCI PowerStation raise the performance another 40 percent or more over the DX4-based systems from Compaq and NEC when running Windows-based applications.

**Fastest Ever:** All the machines tested here use some form of local bus (PCI is clearly preferred on Pentium machines) and very fast video cards. Your disk will no longer slow you down, thanks to improved data-transfer rates on IDE hard drives. But to keep these fast new processors busy, be sure to stoke your system with at least 256K of secondary cache and 16MB of RAM.

**Winner Takes All:** When you're shopping for performance, raw CPU speed is only half the equation. Equally important are engineering, system expansion potential, and vendor service and superior support. We found all these qualities in the Dimension XPS P90.

**Speed to Burn** The Pentium systems we tested ran neck and neck across virtually all our performance tests. The Dimension XPS P90's standard configuration is 8MB of RAM, expandable to 128MB, with a 256K write-back cache, and a PCI-based Number Nine #9GXE64 Pro video card with 4MB of VRAM.

Our unit came with a Conner 1GB enhanced hard drive running on the local bus, a dual-spin CD-ROM drive, and a Sound Blaster 16 audio card. There's plenty of room for expansion in this well-designed case: a total of eight slots, three of which have PCI connectors. The internal layout of the system makes it easy to add cards.

Not bad for a system priced just under $4,500. Look for the 90MHz Pentium in Dell's high-end OptiPlex line of systems as well. Meanwhile, the Dimension XPS P90's aggressive price and searing performance, coupled with the company's legendary service and support, make it a top-drawer system performer.

**Good Deal** Bargain hunters should check out Micron's P90PCI PowerStation, a system that comes configured for industrial-strength Pentium performance: 16MB of RAM, expandable to a whopping 192MB; 256K or 512K Level 2 write-back cache, a Matrox MGA-2 Plus video card on a PCI local bus that's upgradable to 4MB of dynamic RAM (2MB is the standard configuration), and a 540MB IDE hard drive running on the PCI bus.

Like Dell's Dimension XPS P90, Micron's P90PCI PowerStation comes with a dual-speed CD-ROM drive. There are seven expansion slots, three of which can be used for PCI peripherals.

In addition, the PowerStation also comes with software, including Microsoft's Windows for Workgroups and Microsoft Office. At the $3,778

PHOTOGRAPH BY CHANDRA CLARK

# New! HARDWARE: DX4s, P90s from Dell, Micron, Compaq, and NEC

**Best Price:** A 90MHz Pentium desktop doesn't have to break your bank. For under $4,000, you can get what you want. With lots of RAM, a fat hard disk, and multimedia extras, Micron's P90PCI PowerStation is an unbeatable deal. If you crave 90MHz power but are on a tight budget, skimp on the options and you'll find a system near $3,000. For more speed, just wait for the 100MHz Pentiums.

**First DX4s:** Compaq's Deskpro XE 4100 (left) and NEC's Image 4100m (right) will blow away your 66MHz desktop machine. And they're cheap—around $3,000 gets you a fully loaded, fast system.

price for our test configuration, the system provides truly staggering bang for the buck.

**486 Times Three** But what if your budget is a little tighter than that? As it turns out, much of the Pentium's muscle—pipelining and floating-point math, in particular—is wasted on today's 16-bit Windows applications. Intel has finally acknowledged that application vendors have no plans to recompile their programs for the 64-bit Pentium.

If you can live with slightly slower (but still blazing) performance, why not stick with 486 architecture? With systems based on Intel's 100MHz DX4 (the chip costs $270 less than the 90MHz Pentium), you'll outlay fewer dollars, and your Windows applications will still sing.

Compaq's entry joins the company's XE family of slimline Deskpro systems. In some ways, this hobbles the CPU, because the system uses Compaq's proprietary QVision video accelerator, which lagged behind other video subsystems in our tests (although there is a crafty VESA pass-through on the machine for installing your own accelerator). Also, we were disappointed that none of the three side-mounted expansion slots provides local-bus access.

Still, the Deskpro XE 4100 is no slouch. It comes with 8MB of RAM, a 256K Level 2 cache, and a dual-speed CD-ROM drive. The Deskpro's trademark Enhanced Business Audio has been upgraded, and all Compaq systems are now Energy Star–compliant. Also, the Deskpro 4100 XE's price may surprise you: $3,312 with a 525MB hard drive.

**A Multimedia Rocket** NEC's Image 4100m turns in great performance and has a price tag that starts at $2,030. But with its 8MB of RAM (expandable to 128MB) and a 540MB IDE hard drive running on a VL-Bus local bus, and NEC's triple-speed CD-ROM drive, the price hits $3,270.

Other options include a Pro Audio Spectrum 16 sound board and Labtec CS-100 speakers. Oh, yes, it also runs 44 percent faster than a 66MHz Compaq ProLinea 486.

That said, we've got our nits to pick. Though the case on the Image 4100m isn't as cramped as the case on Compaq's Deskpro XE 4100, the heat sink stands a full inch high, blocking one of the four side-mounted expansion slots (two VL-Bus, two ISA). Also, we found the price to be somewhat lofty. Still, for business multimedia, you'll keenly appreciate the NEC's blazing CPU and CD-ROM performance. MARTY JEROME

## FILEBOX

### Dimension XPS P90

**Configuration Tested:** 16MB of memory, 1GB Conner hard drive, Number Nine #9GXE64 Pro video card with 4MB of VRAM, Panasonic dual-spin CD-ROM drive, Sound Blaster 16 sound card.

$4,499
Dell Computer Corp.
(800) 289-3335
*Reader Service No. 603*

### Micron P90PCI PowerStation

**Configuration Tested:** 16MB of memory, 540MB hard drive, Matrox MGA-2 Plus video card, dual-speed CD-ROM drive, no sound card.

$3,778
Micron
(800) 438-3343, (208) 465-3434
*Reader Service No. 605*

### Deskpro XE 4100

**Configuration Tested:** 8MB of memory, 525MB hard drive, QVision video card, dual-speed CD-ROM drive, Compaq Enhanced Business Audio sound system.

$3,312
Compaq Computer Corp.
(800) 345-1518, (713) 378-8820
*Reader Service No. 602*

### Image 4100m

**Configuration Tested:** 8MB of memory, 540MB hard drive, proprietary video accelerator, NEC triple-speed CD-ROM drive.

$3,270
NEC Technologies
(508) 264-8000
*Reader Service No. 604*

PHOTOGRAPHS BY CHANDRA CLARKE

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| 447M—21" | 120Hz | 120Hz | 90Hz | 75Hz | 72Hz | 60Hz |
| 455E—21" | 120Hz | 120Hz | 120Hz | 90Hz | 85Hz | 80Hz |

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**New! HARDWARE:**
**HP LaserJet 4 Plus and 4M Plus**

# Practically Perfect Printing

**USABILITY:** *Simple hardware and driver setups.*
**PERFORMANCE:** *Stunningly fast output.*
**TECHNOLOGY:** *Fast engine, gorgeous 600-dpi output.*
**VERDICT:** *No question. The current king of the bill.*

Is your output lagging your input? Do people in the office line up at your network printer faster than the pages stack? Maybe you need to add a new printer. Or maybe you just need more speed.

If speed's your need, you'll want to check out the latest Hewlett-Packard printers: the LaserJet models 4 Plus and 4M Plus. Unlike the company's older 8-page-per-minute (ppm) predecessors—the LaserJet 4 and LaserJet 4M—these devices print at the healthy clip of 12 ppm and get another helpful speed boost from a 25MHz RISC processor.

The LaserJet 4M Plus is the high-end model, offering both Level 2 PostScript and built-in Ethernet and LocalTalk, in addition to 4MB more of memory than the 4 Plus—necessary to run PostScript. The LaserJet 4 Plus is more plain-Jane, but can be upgraded to the 4M's level. Token-Ring networking is an option on both.

**Natty Networking** Both of these printers offer screaming speeds for standalone users. But don't let that stop you from putting them at the end of your network. The JetDirect card comes standard on the LaserJet 4M Plus, or as a $429 option on the LaserJet 4 Plus, and supports a host of network operating systems. It also supports automatic protocol switching, so that users from a variety of computing environments can seamlessly share one printer.

Either printer will give you the same gorgeous 600-by-600-dot-per-inch text output as the older LaserJet 4's. Graphic output is even better than before—grayscale output has been improved from 51 to 122 shades of gray. You'll see the difference in scanned images like photographs. Our tests found that the output was slightly better with the LaserJet 4 Plus than with the old LaserJet 4 in our presentation image.

Don't worry about font support with either of these printers—HP's got you covered. Both printers ship with 35 Intellifont typefaces and 10 TrueType typefaces, complete with matching TrueType screen fonts. And in the LaserJet 4M Plus, you'll find 35 Adobe Type 1 typefaces.

Locally connected Windows users get the added benefit of bidirectional communications, where users receive job status messages onscreen. Printer out of paper? You'll be informed without having to check the printer itself. Of course, addressing that lack of paper may well be your next problem.

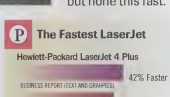
The features don't stop there. In addition to swift speeds and outstanding output, these printers are environmentally aware. Both are Energy Star-compliant and switch to a PowerSave mode when not in use—using only 22 to 28.5 watts. An EconoMode (or draft) printing option uses less toner, which brings long-term savings.

**But Do You Need One?** Should you rush out and buy these latest goodies from HP? If you're disgruntled with slow printing speeds and less-than-outstanding output, then you won't go wrong by plunking down $1,839 for the LaserJet 4 Plus or $2,479 for the LaserJet 4M Plus. And for your next round of printer purchases, the case for the new LaserJets is rock-solid. **KYLA K. CARLSON**

**Superior Sibling:** The LaserJet 4 Plus replaces the successful LaserJet 4. For just $1,839 (the same price as the LaserJet 4), you get the speed of a 12-ppm printer with knockout 600-by-600 dpi text and graphics output. What about competition? None yet. There are good LaserJet-compatible printers out there, but none this fast.

**Swifty Laser:** Add a faster engine and get faster output. Hewlett-Packard took care of the first part, and you get to reap the benefits. In our benchmark tests from a standalone 33MHz 486, the LaserJet 4 Plus performed much faster than its predecessor. The speed difference was most pronounced in our test document that combines text and graphics.

**The Fastest LaserJet**




**FILEBOX**

### LaserJet 4 Plus and 4M Plus

**Standard Memory:** 2MB on LaserJet 4 Plus, 6MB on LaserJet 4M Plus. Not enough? LaserJet 4 Plus is expandable to 66MB; LaserJet 4M Plus to 38MB.

**Resolution:** 600-by-600 dots per inch.

**Networking Options:** Ethernet, Token-Ring, LocalTalk.

$1,839, LaserJet 4 Plus;
$2,479, 4M Plus
Upgrade costs for LaserJet 4 Plus:
$399, PostScript Level 2
$429, JetDirect card, Ethernet
$619, JetDirect card, Token Ring
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PHOTOGRAPH BY CHANDRA CLARKE

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**HP LaserJet 4 Plus and 4M Plus**

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# Practically Perfect Printing

Is your output lagging your input? Do people in the office line up at your network printer faster than the pages stack? Maybe you need to add a new printer. Or maybe you just need more speed.

If speed's your need, you'll want to check out the latest Hewlett-Packard printers: the LaserJet models 4 Plus and 4M Plus. Unlike the company's older 8-page-per-minute (ppm) predecessors—the LaserJet 4 and LaserJet 4M—these devices print at the healthy clip of 12 ppm and get another helpful speed boost from a 25MHz RISC processor.

The LaserJet 4M Plus is the high-end model, offering both Level 2 PostScript and built-in Ethernet and LocalTalk, in addition to 4MB more of memory than the 4 Plus—necessary to run PostScript. The LaserJet 4 Plus is more plain-Jane, but can be upgraded to the 4M's level. Token-Ring networking is an option on both.

**Natty Network**

of these printers offe
ing speeds for st
users. But don't let
you from putting th
end of your network
Direct card comes st
the LaserJet 4M Ph
$429 option on the
Plus, and supports
network operating s
also supports autor
tocol switching, so
from a variety of c
environments can
share one printer.

Either printer wi
the same gorgeou
600-dot-per-inch t
as the older Las
Graphic output is e
than before—grays
has been improv
51 to 122 shades of g

see the difference in scanned may well be your next problem.

**Superior Sibling:** The LaserJet 4 Plus replaces the successful LaserJet 4. For just $1,839 (the same price as the LaserJet 4), you get the speed of a 12-ppm printer with knockout 600-by-600 dpi text and graphics output. What about competition? None yet. There are good LaserJet-compatible printers out there, but none this fast.

**Swifty Laser:** Add a faster engine and get faster output. Hewlett-Packard took care of the first part, and you get to reap the benefits. In our benchmark tests from a standalone 33MHz 486, the LaserJet 4 Plus performed much faster than its predecessor. The speed difference was most pronounced in our test document that combines text and graphics.

**The Fastest LaserJet**

**FILEBOX**


**To create publications that command attention, all you need is Aldus PageMaker 5.0 with ProPack. The ProPack is a priceless offer . . . $750 value, and it's yours FREE.**

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| **CMCD PHOTO CD IMAGES** 50 royalty-free business and art photos ready for use in PageMaker. | 64 |
| FREE! | ~~$752~~ |

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- Aldus PageMaker 5.0 for Macintosh & Windows
- Aldus PageMaker 5.0 for Power Macintosh
- Aldus PageMaker Plus PhotoStyler for Windows

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Your corporate image. It's how the world sees you—on the job, and on the printed page. With the right tools, you can create publications that get noticed. Hold interest. And convey a powerful image.

Introducing Aldus® PageMaker® Plus PhotoStyler® for Windows™. Two expert components that work together as one complete publishing system. Now, you've got the resources you need to combine words and photos into publications that get attention. And results.

**Aldus PageMaker 5.0.
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PageMaker is the power tool that helps you create compelling, versatile page layouts—whether you're working on a brochure, newsletter or manual. Its electronic pasteboard and intuitive interface make it easy to lay out text and graphics precisely. Sophisticated type controls help your message stand out. And when you're done, you can show the world your results in black and white or in color. With PageMaker, you have absolute power to look your professional best.

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Now you can get this incredible publishing team in a special Aldus PageMaker Plus PhotoStyler bundle. It includes full versions of each product, for just $995SRP*. That's a saving of $695 off SRP*! So pick up Aldus PageMaker Plus PhotoStyler today. And create a powerful image with the right tools. At the right price.

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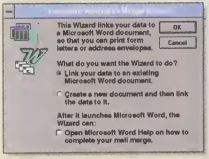
They say you can't be all things to all people. But one database comes really close: new Microsoft Access® database management system 2.0. The first relational database for everyone.




*Mail Merge Wizard works directly with Microsoft Word to place your selected data into the document of your choice.*

If you need a database with a small "d," you've found it. Microsoft Access is easy to use. So easy, you can create tables, make forms, and print reports right from the start.

Want that capital "D" variety? Then fasten your seat belts.

Microsoft Access packs speed, power, and control. Helping database developers quickly create sophisticated database applications.

The fact is, Microsoft Access has something for everyone. Or more precisely, a lot for everyone.

Like new Rushmore™ query optimization, a technology that makes queries lightning fast. So you get your data quicker.

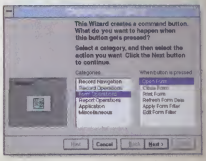
Like Table Wizard, a feature that takes you step-by-step through table setup and design.

Like Query Wizard, a helpful assistant who walks you through the steps of finding your data.

In fact, thanks to IntelliSense™ technology, a Microsoft Office feature, many of your routine tasks will be automatic. And your complex tasks become much easier.

Of course, when you're ready to venture beyond the basics, Microsoft Access is, too. With tools that help you develop powerful database applications. Including engine-level validation guaranteed to keep your data safe.

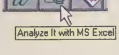
And a programming language featuring an event model for added control and flexibility similar to Microsoft Visual Basic® programming system.




*Add fully functional buttons to a form using the Button Wizard. Microsoft Access does all the work of writing the code behind the button.*

Microsoft Access even makes it easy to tap into any current database you have, from Paradox® to Microsoft SQL Server.

You can also count on unlimited no-charge product support by phone (toll charges may apply).




*With OfficeLinks, send data directly to Microsoft Excel using the Analyze It toolbar button.*

And for as little as $99* for an upgrade or $359* for the Office Professional upgrade, Microsoft Access couldn't be more, well, accessible. For a reseller's name, or to order, call 800-370-8996, Dept. CN3.

Microsoft Office

*qualify for $49 rebate upon acquiring Office Professional 4.3 (1999 upgrade SRP). Plus applicable sales tax. Reseller prices may vary. Offer good until August 31, 1994 and only in the 50 United States. © 1994 Microsoft Corp. All rights reserved. Microsoft the 50 United States & Canada, call your local Microsoft subsidiary or (206) 936-8661. Microsoft, Microsoft Access, PowerPoint, Visual Basic and the Windows logo are registered trademarks and IntelliSense and Rushmore are trademarks of Microsoft Corp.

**New!** HARDWARE:
Macintosh Quadra 610 DOS Compatible

# PC and Mac, Joined at the Chip

**USABILITY:** *Living with a dual personality can be easy.*
**PERFORMANCE:** *Decent Mac and PC speed in tests.*
**TECHNOLOGY:** *Two computers in one—too cool.*
**VERDICT:** *Have your cake and eat it too. Cheap.*

Here's a neat trick: Apple's new DOS Compatible Card transforms a Centris 610 or Quadra 610 into a two-headed hydra, offering both Macintosh power and middle-of-the-road 486 power. The DOS card, which fits on the Processor Direct Slot (PDS), packs a 25MHz Intel 486SX, 8MB of RAM (expandable to 32MB), and enough power to make this the first Macintosh/PC marriage without a performance compromise, unlike the Power Macs reviewed last month (see New! May, page 62). If you spend most of your time on a Mac, but occasionally need to run DOS or Windows applications, the performance is more than acceptable and it's far better than the emulated Windows you get with the Power Macintoshes.

**Fast Enough** We installed the card and compared the dual-personality Quadra 610 DOS Compatible to a top-performing 33MHz 486 system: Advanced Logic Research's Evolution. In all of our tests, the Quadra was close on the heels of the Evolution. The DOS card's compatibility is also flawless: We ran Winstone, a benchmark test that stresses the best Intel-based PCs, and the Quadra performed without a hitch.

A number of features make living a dual-CPU life easier than you would expect: The machine automatically handles either Apple or DOS floppies thanks to PC Exchange software. The CD-ROM drive is accessible from System 7, DOS, and Windows. Furthermore, you can specify which parts of your Mac hard disk you'd like to share between platforms. Files placed in this shared area can be accessed directly by the DOS or Macintosh operating system. Each system also has its own protected hard disk space. You can even reboot DOS while the Macintosh applications keep running.

**Smart Clipboard** Just for kicks, we loaded up a few applications that are available for both System 7 and Windows, and tried to cut and paste between the Quadra's two brains. Thanks to system software that comes with the card, this worked fine.

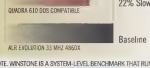
The DOS Compatible Card supports VGA video but with only 512KB of VRAM. If there's an Achilles' heel, this is it. The built-in video can run only at 800 by 600 pixels, which is subpar by today's standards. At least you can set up two monitors (a common Macintosh bonus). The only other noteworthy glitch is the keyboard. The standard $85 keyboard is fine for navigating System 7, but try pulling off DOS and Windows functions without Alt, Control, Delete, or function keys—good luck. The $175 enhanced keyboard duplicates PC function keys and should come standard with the system.

The Quadra 610 DOS Compatible we tested came fully configured with a DOS Compatible Card and DOS 6.2 and Windows 3.1 preinstalled. It's a steal at $2,179. If you already have a Quadra or Centris 610, the DOS Compatible Card can be yours for a mere $399—which is great for you Macintosh lovers who suffer occasional PC envy. ADAM MEYERSON

**Can't Decide?** Talk about multiprocessing: This machine has two CPUs, two operating systems, and two video systems, all controlled by one keyboard. Even when Windows crashes, the Mac brain in this split-personality PC keeps on ticking. (This is not a first for Apple. Back in 1984, Microsoft made a Z80 processor card—the Softcard—to run CP/M on a 6502-based Apple II.)

**A Real PC:** Unlike Power Macintoshes, which run Windows applications at glacial speeds, the Quadra 610 DOS Compatible executes x86 commands at a respectable pace—thanks to its real (not emulated) 25MHz 486 CPU. This dual-CPU solution costs less than a Power Mac, too. But this is not the fastest Mac by any means—if you need screaming Mac and PC speed, buy two machines.

**Windows Speed**




NOTE: WINSTONE IS A SYSTEM-LEVEL BENCHMARK THAT RUNS 12 OF THE MOST POPULAR WINDOWS BUSINESS APPLICATIONS

**FILEBOX**

**Quadra 610 DOS Compatible**

**Operating Systems:** Apple Macintosh System 7, DOS, Windows.

**DOS Chip:** 25MHz 486SX.

**Mac Chip:** 25MHz 68LC040.

**Hard Drive:** 160MB.

**RAM:** 486 card has 8MB standard, expandable to 32MB.

**Macintosh Networking:** AppleTalk and Ethernet.

$2,179 (with monitor and keyboard)
$399, DOS Compatible Card (requires a Macintosh system)
Apple Computer
(800) 538-9696, ext. 525
*Reader Service No. 607*

PHOTOGRAPH BY CHRISTINE ALICINO

**Flexibility** (ˌflek·sə·ˈbil·ət·ē) *n.* 1. A feature previously not found in this category. *example:* For under $800, **TI microWriter** printers give you the *flexibility* to start with **Adobe PostScript** or add it later; the comparable HP 4L does not.

# THE UNDER $800 PRINTER, REDEFINED.

If you're looking for a printer with a street price well under $800,* you'll have a hard time finding one with as many features as a TI microWriter.

Let's compare it to our leading competitor, HP, starting with basic models. First, take flexibility. Ours lets you add PostScript now or later. With the HP 4L you can't add it at all. Take paper handling. Ours comes with a 250-sheet tray standard, theirs with just a 100-sheet. Speed? We give you 5 ppm, they give you 4. Yet in spite of all this, we still list for hundreds of dollars less.

Now, let's compare high end models. As you'll see from the chart, the features are basically comparable – till you get to price.

And once again, the TI microWriter is clearly the better value. In fact, we're so confident you'll like it, we'll give you our 30-day satisfaction guarantee.** For more information or a dealer near you, call *1-800-TI-TEXAS* (1-800-848-3927).

| | | TI microWriter Basic | HP 4L | TI microWriter PS23 | HP 4ML |
|---|---|---|---|---|---|
| *Print Speed* | | *5 ppm* | *4 ppm* | *5 ppm* | *4 ppm* |
| *PostScript* | | *Upgradeable* | *No* | *Standard* | *Standard* |
| *Paper Trays* | *(std.)* | *250 sheet* | *100 sheet* | *250 sheet* | *100 sheet* |
| | *(opt.)* | *250 sheet* | *Not Avail.* | *250 sheet* | *Not Avail.* |
| *List Price* | | *$599* | *$849* | *$799* | *$1279* |

EXTENDING YOUR REACH WITH INNOVATION™

TEXAS INSTRUMENTS

**Circle 205 on reader service card.**

Adobe PostScript

205LPS

*Specifications in chart are based on information* as of 5/94. *Estimated dealer price. Dealer prices will vary. **Offer applies if returned in good condition. microWriter and "Extending Your Reach With Innovation" are trademarks of Texas Instruments. Adobe, PostScript and the PostScript logo are registered trademarks of Adobe Systems, Inc. © 1994 TI.

# *It's a Jungle Out There... May the Fittest Survive.*

**MAG InnoVision DX17F**
*Microprocessor-based, digitally controlled 17-inch color monitor*

**NEC 4FGe**
*Microprocessor-based, digitally controlled 15-inch color monitor*

**MSRP $799**

This monitor has a lot of concern for the environment (Green Energy-EPA Energy Star, VESA DPMS, no CFC, SWEDAC MPR II).

This monitor has a lot of display area (118 square inches),

And this monitor has a 0.26mm dot pitch, and a 1280 x 1024 maximum resolution,

which means while this monitor has enormous respect for your wallet,

That's why this monitor should also appeal to your sense of responsibility and value.

**ESP $755**

This monitor has it, too. (EPA Energy Star, VESA DPMS, SWEDAC MPR II).

This monitor has a lot less. (27 square inches less).

This monitor has neither.

This monitor does not.

And this monitor should not.

**Circle 181 on reader service card.**

So call us at 1-800-827-3998 (1-714-751-2008 in CA) for more information on this monitor.

MAG INNOVISION

## New CorelDraw 5

# New Corel Draws a Crowd

**USABILITY:** *Everything's easier to use, especially Ventura.*
**PERFORMANCE:** *Our beta software ran at a fair clip.*
**TECHNOLOGY:** *A huge range of high-end graphics.*
**VERDICT:** *A complete graphics suite for a song.*

What kind of deal is the new CorelDraw 5? If it were a car, it would be like shopping for a Honda Civic and getting a Porsche for the same price—plus a pickup truck, a minivan, a BMW, and a couple of motorcycles, too. In the game of one-upmanship, Corel has blown the rules through the roof. The new CorelDraw 5 includes so much raw graphics power for $895 that it borders on the ridiculous.

Version 5 includes not only updates to CorelDraw, Corel PhotoPaint, CorelChart, and the other components of Version 4, but also a new version of the desktop publishing program, Corel Ventura (Corel acquired the program from Ventura Software last October). With the addition of Ventura, Corel's graphics suite can handle just about any design task you can imagine: illustration, photo retouching, presentations, business graphics, and full-scale desktop publishing. Better yet, all the applications in the suite benefit from an improved interface and better performance.

**Quick Draw** The core product, CorelDraw 5, includes new special effects and textures, from new fountain fills and texture fills to special effect lenses such as Magnify, Transparency, Heat Map, and Invert. Another major new feature is the nifty PowerClip, which allows you to create a mask by placing an object inside any shaped container. This makes it easy to crop any kind of image to a specific shape or place an image inside text.

We were also impressed with the weld, trim, and intersection tools that streamline the manipulation of object shapes. For example, you can join any two overlapping shapes by "welding" them, or easily remove shapes to get an effect that is similar to die cutting.

The new PhotoPaint module is also more sophisticated and useful. You can now open just a part of a large color file à la PhotoStyler—a big productivity boon when working on high-color images. There are also realistic brushes and other artists' media like those found in Fractal Design Painter.

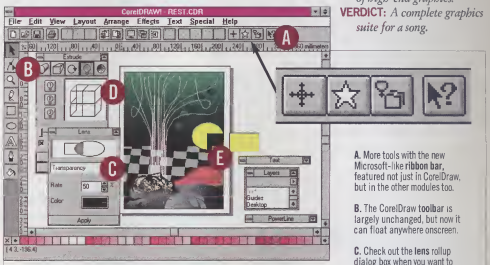
PhotoPaint also features a layer-based file format with a big benefit: Paste an object into your picture, and you can continue to work with it in later sessions—it doesn't become part of the main picture until you export it to PCX or some other bit-mapped file format. Corel also threw in a pile of new brush styles and flood fills—and the capability of adding text directly to your graphics.

One other plus: PhotoPaint supports Adobe Photoshop plug-in modules, so that you can add effect filters such as Kai's Power Tools. In terms of overall usefulness, PhotoPaint 5 gives Photoshop a serious run for its money.

**Ventura's Capital** The addition of Corel Ventura 5 as part of the package is big news, although it wasn't fully integrated into the prerelease version we evaluated. The still-separate program we did look at packs a new look, consistent with the rest of the Corel suite, and it features a new story editor, new import and export filters (including standard generalized markup language, or SGML, format), irregular text wrap, and other new features.

Want to wrap text around irregular objects? You can. Need to rotate objects with one-tenth of a degree accuracy? No problem. Tired of switching tools when handling different objects? Ventura now does it for you. And its color-management capability and font handling is somewhat better than before.

Ventura is further pumped up with the addition of a




**Looks Great, More Filling:** You'll find more of what you need more easily in the new CorelDraw. The addition of scads of new tools and effects (such as more textures, fills, and lenses) doesn't clutter the interface. These additions are stored in a sensible layout of tools, accessible from the new ribbon bar and floating toolbars, with their tear-off contents. Corel also concentrated on consistency across all the applications in the suite.

**A.** More tools with the new Microsoft-like **ribbon bar**, featured not just in CorelDraw, but in the other modules too.

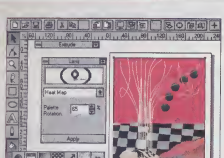
**B.** The CorelDraw **toolbar** is largely unchanged, but now it can float anywhere onscreen.

**C.** Check out the **lens** rollup dialog box when you want to add paintlike effects to your vector drawings or meld two objects together.

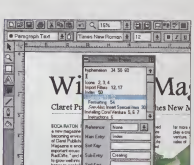
**D.** CorelDraw's **extrude** rollup now has three light sources for 3-D rendering-style and highlight-and-shadow effects.

**E.** New **weld and trim** tools combine and die-cut shapes for effects such as this "bite out of the circle."

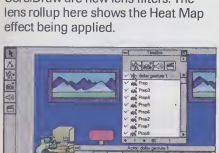
## GUIDED TOUR TASTY MORSELS IN A GRAPHICS BANQUET



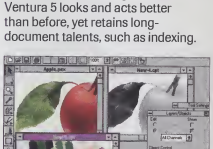
**CorelDraw:** New effects, anyone? Among the 50 or so additions to CorelDraw are new lens filters. The lens rollup here shows the Heat Map effect being applied.



**Corel Ventura:** Recognize this? Ventura 5 looks and acts better than before, yet retains long-document talents, such as indexing.



**CorelMove:** Lights, animation, sound, action! The new CorelMove's rollup tools now handle cell-by-cell editing of animations.



**PhotoPaint:** Revamped to work more like Draw, PhotoPaint now handles colors in multiple layers (the gray apple shows the red channel) and new artistic effects.

## FILEBOX

### CorelDraw 5

**Graphics Applications:** CorelCapture, CorelDraw, Corel PhotoPaint, CorelTrace.

**Publishing Applications:** Adobe Acrobat Reader, Corel Ventura.

**Business Graphics Applications:** CorelChart, CorelMove, CorelShow.

**Graphics Management Applications:** Ares FontMinder, CorelMosaic.

**Resources:** 825 PostScript Type 1 and TrueType typefaces, 22,000 clip-art images.

**Minimum System:** 386, 8MB of RAM.

**Recommended System:** Fast 486, 16MB of RAM, CD-ROM player.

$895 (CD-ROM and floppy disks); $695 CD-ROM version (no floppy disks)
Corel Corp.
(800) 772-6735,
(613) 728-3733
*Reader Service No. 611*

couple of publishing utilities—a database publishing tool called CorelQuery and a tag management tool called Tag-Write, which handles SGML, among other formats. We've known Ventura since its GEM days—and this is barely recognizable as the same program. Only its indexing, cross-referencing, and other handy long-document features remain untransformed.

**But Wait** There's more: In addition to more fonts and clip art than you can count, the three CD-ROMs that contain the Corel collection include Ares FontMinder (font management software reviewed in New! November 1993 on page 104), Adobe's Acrobat Reader (reviewed in New! August 1993 on page 46), and an enhanced CorelChart. If your spreadsheet needs are light, this last module helps a lot—it has enough muscle to exist as a standalone product, with its 300 new functions and support for additional chart types and 3-D effects.

In fact, CorelChart 5 is another example of a product overhauled almost beyond recognition. Like the other modules, it has floating toolbars and a ribbon bar—which are particularly handy for the extra functions in the module (including statistical, financial, and other formula types). The spreadsheet has also swelled in size to 16,384 rows by 240 columns—cells that can be formatted with the ubiquitous CorelDraw fills and outlines.

CorelMove is yet another case of hidden treasures. This animation tool has 300 new actors, sound effects, and props to tinker with, bringing the total to more than a thousand. And if that isn't enough for you, get a load of the new morphing capability.

OK, you're saying, so much for the fun and games. What about the presentations? If you've ever been ticked off by CorelShow's lack of speaker notes, impaired portability, and grinding performance, take heart. But we were pleasantly surprised by the new CorelShow on all these counts. Its new runtime engine fits comfortably on a floppy, and the whole application, runtime and otherwise, goes at a fair clip.

Almost everything you could want for graphics and desktop publishing production is in here. If it's too much to take in, you can still buy CorelDraw 4 for less. But once you've sampled this impressive graphics suite, it's tough to go back. CorelDraw 5 is highly recommended. JON PEPPER

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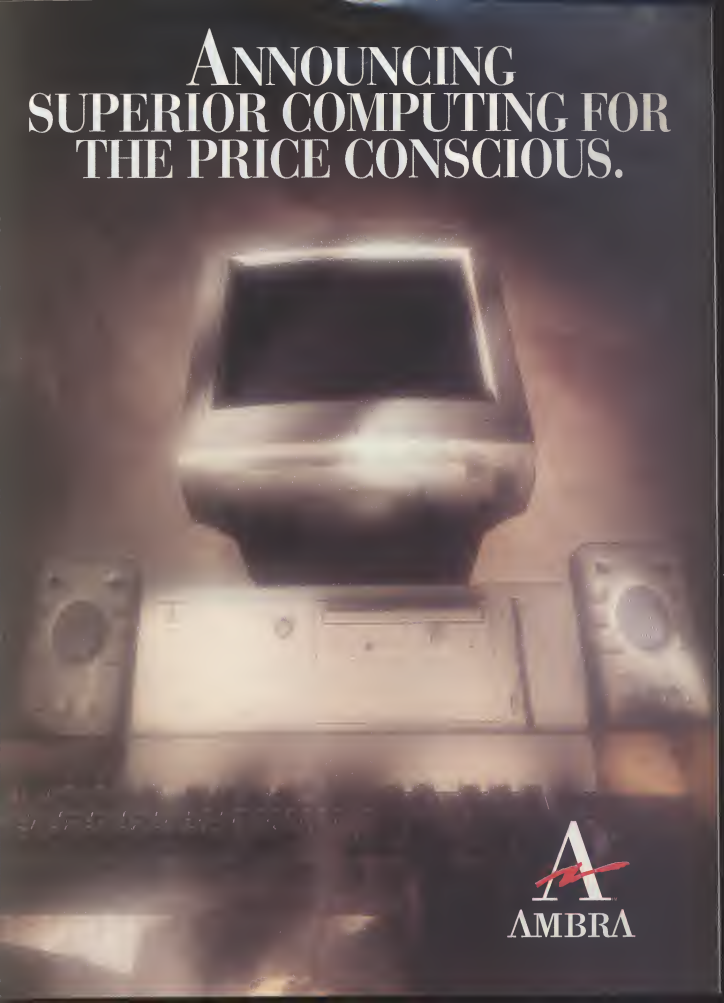
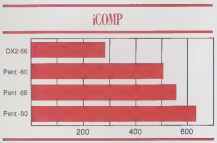


AMBRA

# "THE NEW WINDOWS/MULTI

That's what *Windows Sources** called our 60 MHz Pentium AMBRA™ system. And now we're building desktops and towers with the **90 MHz INTEL® PENTIUM™** processor! The right choice to make your apps fly, this chip is an amazing **30% FASTER** than its 66 MHz forerunner.

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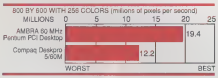

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- Pentium processor, 90 MHz
- 64-bit CPU-memory-cache data path
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- 4 ISA, 2 PCI, 1 ISA/PCI slot
- 440MB IDE hard disk
- 6 drive bays
- Fast PCI IDE controller
- PCI graphics, 2MB
- 15" FST-NI color monitor, LR
- Double-speed multisession CD-ROM drive
- 3.5" 1.44MB diskette drive
- Lexmark™ PS/2®-style 101-key keyboard
- MS-DOS® 6.2, Windows™ 3.1, mouse

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## DP60/PCI

- Pentium processor, 60 MHz
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- 256KB L2 and 16KB L1 cache
- 8MB RAM, max: 128MB
- 4 ISA, 2 PCI, 1 ISA/PCI slot
- 340MB IDE hard disk
- 6 drive bays
- Fast PCI IDE controller
- PCI graphics, 2MB
- 15" FST-NI color monitor, LR
- 3.5" 1.44MB diskette drive
- Lexmark PS/2-style 101-key keyboard
- MS-DOS 6.2, Windows 3.1, mouse
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- 6 drive bays
- Fast PCI IDE controller
- PCI graphics, 2MB
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- 256KB L2 cache
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## 486 SYSTEMS

### D433SXA

- 486SX, 33 MHz
- 128KB L2 cache. max:256KB
- 4MB RAM, max: 36MB
- 5 16-bit ISA slots
- 240MB IDE hard disk
- 5 drive bays
- Local bus IDE controller
- Local bus graphics, 1MB
- 14" SVGA color monitor, LR

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### S450DXA

- 486DX2, 50 MHz
- 128KB L2 cache, max:256KB
- 4MB RAM, max: 36MB
- 3 16-bit ISA slots
- 240MB IDE hard disk
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- Local bus IDE controller
- Local bus graphics, 1MB
- 14" SVGA color monitor, LR

**$1,599**

### D466DXA

- 486DX2, 66 MHz
- 128KB L2 cache, max: 256KB
- 4MB RAM, max: 36MB
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- Intel DX4, 100 MHz
- 256KB WriteBack L2 and 16KB cache
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- 540MB IDE hard disk
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- Local bus IDE controller
- Local bus graphics, 1MB
- 15" FST-NI color monitor, LR

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## PENTIUM/PCI

### DP60/PCI

- Pentium processor, 60 MHz
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- 256KB L2 and 16KB L1 cache
- 8MB RAM, max: 128MB
- 4 ISA, 2 PCI, 1 ISA/PCI slot
- 340MB IDE hard disk
- 6 drive bays
- Fast PCI IDE controller
- PCI graphics, 2MB
- 15" FST-NI color monitor, LR
- Double-speed multisession CD-ROM drive

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### DP90/PCI

- Pentium processor, 90 MHz
- 64-bit CPU-memory-cache data path
- 256KB L2 and 16KB L1 cache
- 8MB RAM, max: 128MB
- 4 ISA, 2 PCI, 1 ISA/PCI slot
- 440MB IDE hard disk
- 6 drive bays
- Fast PCI IDE controller
- PCI graphics, 2MB
- 15" FST-NI color monitor, LR
- Double-speed multisession CD-ROM drive

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## PENTIUM EISA/VESA

### DP60E/VL

- Pentium processor, 60 MHz
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- 256KB L2 cache
- 8MB RAM, max: 64MB
- 6 EISA, 2 EISA/VESA slots
- 540MB SCSI hard disk
- 6 drive bays
- Integrated SCSI-2 controller
- VESA 32-bit graphics, 2MB
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## MOBILE SYSTEMS

### SN425C-170

- 486SX, SL-Enhanced, 25 MHz
- 4MB RAM, max: 20MB
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- 7.8" STN color screen
- 1 PCMCIA slot, Type II
- 86-key keyboard
- Integrated 16mm trackball
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- Slip case
- 4 lbs, including battery

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### N450T-200

- 486DX2, 50MHz
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- 3.5" 1.44MB diskette drive
- 200MB hard disk
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### SN Road Warrior:

• PCMCIA 2.4/9.6 kbps data/fax modem • Extra battery, battery charger • Carrying case **$386**

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**USABILITY:** *New tools, easier to use than ever.*
**PERFORMANCE:** *CPU monitoring really pays off.*
**TECHNOLOGY:** *Impressive crash protection.*
**VERDICT:** *The ultimate toolkit for DOS and Windows.*

# Norton Ratchets Up Utilities

Stock a toolkit without a screwdriver and pliers? Don't even think of it. Build a PC tool collection without Symantec's superb Norton Utilities? That's equally unthinkable.

The new Norton Utilities 8.0 gives you all the great Windows data-protection tools available in Norton Desktop for Windows (including Disk Doctor, Speed Disk, and System Information), plus some important new ones. It also delivers all of the great DOS utilities from Norton Utilities 7.0, but again adds some notable improvements. All told, there are more than 40 tools in the $179 package.

**Irked by IRQs?** In the new tool belt of great utilities there is one DOS hammer that we've been craving for years: interrupt-conflict analysis. Norton's updated Diagnostics utility checks every hardware device on your system while you watch, aggressively pushing each device to generate an interrupt. Diagnostics helped find a minor mouse conflict on one system the very first time we used it. We're sold.

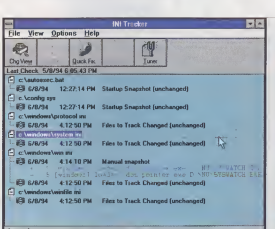
In March, we described a killer tool in PC Tools 2.0 for Windows: CrashGuard, a system resource monitor with warning alarm (see New!, March, page 34). But Norton's Sys Watch goes CrashGuard one better. It checks the gamut of memory and resource types, and provides warnings whenever one type of resource runs into potential bottlenecks (see "The Sys Watch Advantage," above right).

**Fine-Tuning** Are you finished with INIs? Want more Windows customization tools? Version 8.0 has 'em. INI Tuner is one of the best. It provides a superset of Windows' Control Panel's settings that let you view INI Tuner entries in a Control Panel-like view, that's grouped under icons, or in text form, if you prefer. Symantec also added five icons that give you graphical dialog box access to INI settings that previously required manual editing of INI files—such as vertical spacing of icons, changing the system font, and using the mouse in a windowed DOS application.

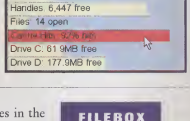
Don't feel comfortable tinkering with your INI files? Don't fret. Look at INI Advisor to learn more about the art of Windows configuration tweaking safely and effectively. You can browse it whenever you have spare time, or dip into it directly from INI Tuner before you make major changes.

Other new features in the Norton smorgasbord include Windows versions of Disk Doctor and Speed Disk that can work in the background for continual protection and optimization. Because these utilities monitor CPU usage, they will run and monopolize your system resources only when you're not busy.

Norton Utilities 8.0 is truly the essential toolkit for DOS and Windows users. Symantec recently acquired Central Point, which makes another excellent set of utilities, PC Tool Pro. But Norton Utilities 8.0 is superior. Even if you already own Norton Desktop 3.0 for Windows, the new features like INI Tracker and Sys Watch make this collection a worthwhile purchase. SCOT FINNIE




**One-Minute INI Manager:** INI Tracker takes a snapshot of any configuration file you select *before* an application's install routine changes it. Uninstall the program later, and you can restore the original INI setup. Drawback: The list of changes doesn't name the program you installed—you figure it out from the uninstuitive date stamp.




**The Sys Watch Advantage:** What more do you need to know? Norton's Sys Watch, shown at right, tracks the usage of all kinds of memory and resources, and it tracks free handles, open files, cache hits, and free disk space. Best of all, you can pick which elements you want to watch, and float Sys Watch at the bottom of the screen.

## FILEBOX

### Norton Utilities 8.0

**Key Windows Utilities:** Disk Doctor, File Compare, INI Advisor, INI Editor, INI Tracker, INI Tuner, Speed Disk, SysInfo, Sys Watch.

**Key DOS Utilities:** Disk Duplicator, File Find, FileFix, NDOS, Rescue Disk, Safe Format.

**Minimum System Configuration:** 286 (for the DOS utilities); 386 with 4MB (when using Windows utilities).

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**New! SOFTWARE:** Stacker 4.0 for Windows and DOS

**USABILITY:** *Easy to install and maintain.*
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**TECHNOLOGY:** *Best disk compression yet.*
**VERDICT:** *Better than any built-in tool available today.*

# Double Your Data, Double Your Fun

Pick a DOS, any DOS. Microsoft, Novell, and IBM all have variations of DOS with disk-compression tools built in (or at least they did until recently). But in our opinion, they don't compress enough, or fast enough or safely enough. And their integration with Windows is well below par. But all these problems can be solved if you go past the DOS packages and pick up a copy of Stac Electronics' Stacker 4.0 for Windows and DOS.

The biggest change in the new version: Its real-time compression is tighter than ever—in some cases it can more than double the amount of workable space on your hard disk. Not only that, the Stacker code requires less than half the RAM of DoubleSpace. And unlike the stripped-down compression utilities that come with DOS, it offers password protection, a good optimizer, and a slew of other utilities.

**Safety First** Stacker provides greater safeguards, too. It maintains uncompressed duplicates of your DOS system's AUTOEXEC.BAT, CONFIG.SYS, and file allocation table (FAT). And during installation, the program detects your Windows Swapfile, leaving space in the uncompressed portion of the stacked drive to house the extra FAT.

Stacker also incorporates Novell's DOS Protected-Mode Services, which improve Stacker's network server and workstation compatibility.

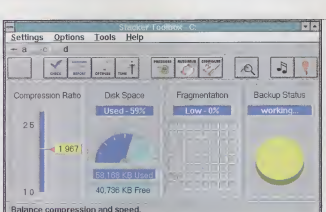
Want the safety net of an uninstall option? Stacker's Uncompress does just that, leaving your program and data files intact. The only thing it doesn't do is back up your disk before you uninstall the program—a move we recommend before doing any major upheaval with Stacker or any compression tool. While we didn't experience any disk problems we could attribute to Stacker, it's best to play it safe.

**Then Convenience** The new Stacker takes less than 15 minutes to install over a DoubleSpaced or SuperStored drive—although once converted, you'll want to run Stacker's Optimizer (which might take an hour or even longer) to provide greater file compression.

Stacker provides a Toolbox for Windows, which, when it's minimized, displays the amount of free disk space in its icon. Windows File Manager also undergoes a change: A Stacker menu item provides detailed information on the filenames, types, sizes, and actual compression ratios of each listed file or type of file, as well as a handy overview showing the expected and actual compression ratios.

The Stacker Toolbox gives you access to three compression settings: MaxSpace, MaxSpeed, and a fairly comfortable middle-of-the-road setting you can fine-tune using a ten-setting slider bar. We found the 78 percent space gain from MaxSpeed an adequate compromise between free space and system performance. However, the system response time began to slacken at higher compression ratios.

At $149, Stacker won't necessarily give you the dollar a-megabyte return of buying a new drive—at least not if you compress your new drive already. But it will breathe new life into a crammed hard disk. And if you don't want to install new hardware—or can't get the purchase approved by the people in accounting—it's a great choice. SALLY NEUMAN




**Stacker Toolbox:** The Stacker software provides quick access to compression ratios and other disk information. But more important, the Toolbox's button bar provides powerhouse security measures: password protection, disk-integrity checks, and AutoSave.

**More the Merrier?** Compression ratios vary depending on what's on your hard disk. If you have a lot of raw text files, they'll crunch down drastically–a ratio of 9-to-1 isn't unusual, even at MaxSpeed setting. EXE and DLL files compress less, of course. Performance chart shows compression on a typical hard disk (full of programs and data) using Stacker's MaxSpeed setting.

**FILEBOX**

## Stacker 4.0

**Compression Features:** Two preset levels—MaxSpace and MaxSpeed. Ten interactive settings.

**Driver Memory Overhead:** 17KB.

**Typical Compression Ratios (as Tested):** 1.8-to-1 through 2-to-1.

**Key Windows Utilities:** Backup status, compression ratio gauge, disk space gas gauge, fragmentation report.

**Key DOS Utilities:** Optimizer, password protection.

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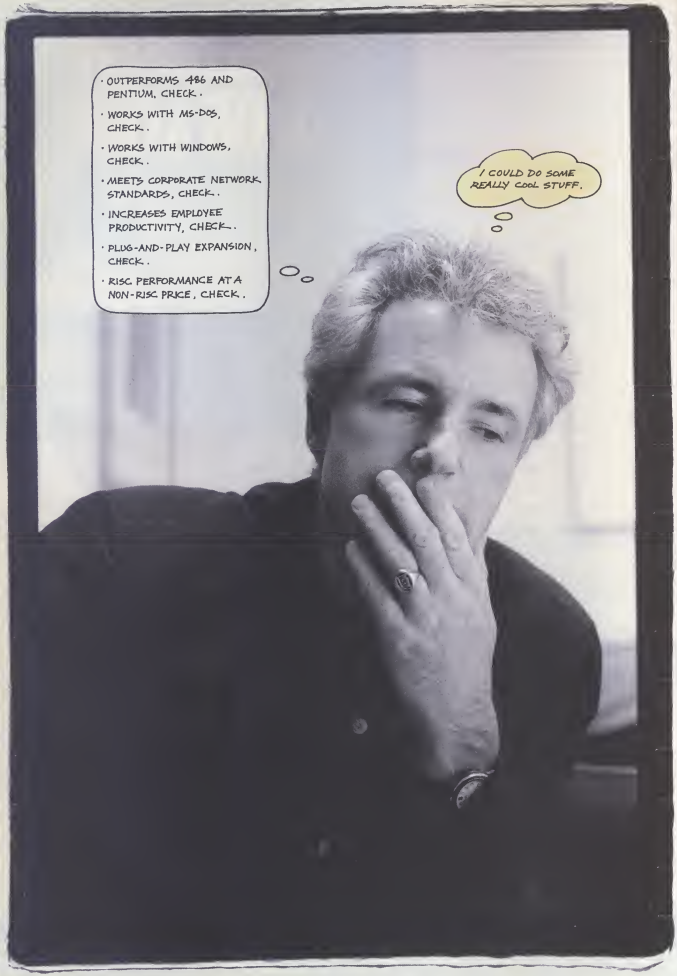
· OUTPERFORMS 486 AND PENTIUM. CHECK.
· WORKS WITH MS-DOS, CHECK.
· WORKS WITH WINDOWS, CHECK.
· MEETS CORPORATE NETWORK STANDARDS, CHECK.
· INCREASES EMPLOYEE PRODUCTIVITY, CHECK.
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Great Plains Dynamics Release Two
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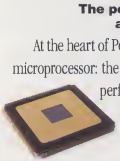


*The PowerPC 601 has a lot of power inside it: the combined resources of IBM, Motorola and Apple.*

RISC technology brings a whole new level of performance to personal computing. Software written to take advantage of its unique capabilities, in fact, will blow the doors off the same programs written for 486 PCs—and will run significantly faster than programs for Pentium processor-based PCs.

RISC technology makes everything work faster: from 3-D modeling applications that require floating-point computations to basic business software.

| Power Macintosh | 6100/60 | 7100/66 | 8100/80 |
|---|---|---|---|
| Processor | PowerPC 601 | PowerPC 601 | PowerPC 601 |
| Speed | 60 MHz | 66 MHz | 80 MHz |
| Memory | 8MB to 72MB | 8MB to 136MB | 8MB to 264MB |
| Expansion slots | 1 PDS or NuBus | 3 NuBus | 3 NuBus |
| Hard disk storage | 160MB or 250MB | 250MB or 500MB | 250MB to 1GB |
| Video support | DRAM | DRAM, VRAM 1MB to 2MB | DRAM, VRAM 2MB to 4MB |
| Networking | Ethernet | Ethernet | Ethernet |
| Apple Price | From $1,819 | From $2,899 | From $4,249 |

*All this plus built-in Macintosh PC Exchange™, AppleScript™, QuickTime™ software, TrueType™ fonts, GeoPort™ serial ports, 16-bit stereo audio input and output, file sharing without a dedicated server and more.*

Combine the increased power of RISC with the practical simplicity of a Macintosh, and the result is more work done in less time, with lower training and support costs.

### The power to run MS-DOS, Windows and Macintosh software.

Many Power Macintosh configurations come bundled with SoftWindows, a software innovation that enables Power Macintosh to run hundreds of off-the-shelf MS-DOS and Windows programs at 386 and 486 performance levels. (Of course, every Power Macintosh can run thousands of Macintosh personal productivity programs, too.)

But that's just the beginning. "By the end of 1994," wrote *PC/Computing*, "you'll see

*From left, the Power Macintosh 8100/80, Power Macintosh 7100/66 and Power Macintosh 6100/60.*

*Effective 3/14/94. Apple Price includes the Power Macintosh 6100/60 with 8MB of memory and a 160MB hard drive. For the sake of custom configuration, keyboard, monitor and mouse are sold separately. Unless bundled with a particular configuration, SoftWindows must be purchased separately. TrueType are trademarks of Apple Computer Inc. PowerPC is a trademark of International Business Machines Corporation used under license therefrom. SoftWindows is a trademark of Insignia Solutions Inc.*

**New!** **SOFTWARE:** Lotus 1-2-3 Release 4 for DOS

**USABILITY:** *New menus on an old design.*
**PERFORMANCE:** *Quick for a DOS application.*
**TECHNOLOGY:** *New memory manager, network features.*
**VERDICT:** *Best for 1-2-3 users who want to stick with DOS.*

# Adequate Upgrade Stuck in DOS Era

Life is looking up for DOS spreadsheet users. The new 1-2-3 for DOS includes a spell-checker, a cleaner interface, a handy tutorial, automatic file backup, and the electronic equivalent of yellow sticky notes. It's an obvious upgrade. But there's a catch: Sharing files between the Windows and DOS versions of the spreadsheet, while possible, requires an awkward data two-step.

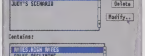
When you start up 1-2-3 Release 4, the first thing you'll notice is a more attractive graphical and Windows-like screen. Like its Windows cousin, 1-2-3 for DOS displays nameable tabs to let you quickly jump to another worksheet in the current file. Also new to 1-2-3 are scroll bars and the live status bar found in other Lotus Windows products—which make it easy to change fonts and numeric formatting with your mouse.

Although you'll be tantalized with new visual goodies in 1-2-3 Release 4, you'll still find the same menu structure that 1-2-3 aficionados have learned to love (or at least tolerate). To its credit, there are some new dialog boxes to eliminate some menu work. But perhaps the biggest disappointment with this release is that it still relies on the Wysiwyg add-in for formatting—resulting in two completely separate menu systems (one for spreadsheet functions and one for formatting). For example, if you set a print range using /PRINT RANGE, the Print command in the Wysiwyg menu won't recognize it.

Impressively, you'll find a scaled-down implementation of the Version Manager we first saw in 1-2-3 Release 4 for Windows, which lets you create different data scenarios that you can save within your worksheet. The drawback to 1-2-3 for DOS's Version Manager comes when you open your worksheet in the Windows version: 1-2-3 for Windows ignores version and scenario information stored in a 1-2-3 for DOS worksheet.

**Great Graphics:** Lotus 1-2-3 Release 4 for DOS is much more appealing than earlier versions. First, you'll find the SmartIcons you see in all of Lotus's Windows products. In addition, you'll find scroll bars, and a live status bar that makes changing fonts and numeric formatting a breeze. Following the lead of other Windows spreadsheets, Lotus 1-2-3 also supports nameable tabs that let you maintain and quickly jump to different worksheets within one spreadsheet file.

**What If. . .?** Lotus 1-2-3 Release 4 for DOS includes a Version Manager to help simplify what-if analysis. However, the Windows version of 1-2-3 does not recognize versions and scenarios that are defined in 1-2-3 for DOS.




**DOS to Windows** In fact, you will discover some other compatibility shortcomings in 1-2-3 Release 4 for DOS. Despite common version numbers, the DOS and Windows versions use different file formats: 1-2-3 for DOS still uses the WK3 file format (plus a separate FM3 file that holds formatting information) and can't read 1-2-3 for Windows worksheets directly. However, you can save your Windows spreadsheets in the WK3 format or use a separate translation utility that Lotus bundles with 1-2-3 for DOS. Even so, 1-2-3 for Windows supports quite a few additional @ functions that will display ERR when opened to a WK3 file. One welcome addition to the new 1-2-3 for DOS is a memory management technique that uses all available RAM, including EMS and extended memory. If you're short on chips, 1-2-3 will create virtual memory on your hard drive. This may slow things down quite a bit, but it's better than getting the dreaded "out of memory" error.

**Old vs. New** Veteran 1-2-3 for DOS users will find lots to like here, but novices or first-time buyers could find the dual menu system confusing and will be better off with any of the Windows spreadsheets. ROBIN J. WALDEN

**FILEBOX**

**1-2-3 Release 4 for DOS**

**System Requirements:** 286 processor or better, 2MB of available RAM.

**Hard Disk Space:** 5MB minimum installation; 12MB maximum.

**Macro Compatibility:** Compatible with macros from all prior releases of 1-2-3 for DOS.

**Networking:** Includes built-in front-end to cc:Mail for DOS.

$495; $129 upgrade
Lotus Development Corp.
(800) 343-5414, (617) 577-8500
*Reader Service No. 614*

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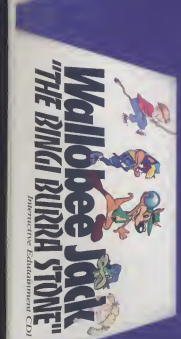
# around M

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Integrated Communications Software v.3.0

**New!** SOFTWARE: QmodemPro for Windows

# A Quick Fix for Online Addicts

**USABILITY:** *Point-and-click connections and macros.*
**PERFORMANCE:** *Performs file transfers in background.*
**TECHNOLOGY:** *Automatic RIP support.*
**VERDICT:** *Best communication application for BBS junkies.*

There's no shortage of Windows-based communications packages. From Datastorm Technologies' ProComm Plus to Digital Communications Associates' CrossTalk to Delrina's WinComm Pro, many companies offer some combination of icon-based dialing directories, macro buttons, on-the-fly terminal and emulation switching, and customizable desktops. Mustang Software's relative latecomer, QmodemPro for Windows, at first appears no different—it abandons QmodemPro for DOS's emphasis on scripting and off-line mail management for the fashionable GUI goodies of the competition.

But this is more than me-too software. As befits a communications package from one of the leading makers of bulletin board software, QmodemPro for Windows is specifically tailored to the needs of the die-hard BBS surfer.

**RIP Roaring** QmodemPro for Windows is unique in offering built-in support for RIPscrip, the de facto standard for graphical BBSs. With RIP (Remote Imaging Protocol) support enabled, users can navigate a BBS by mouse instead of by a cryptic keyboard menu.

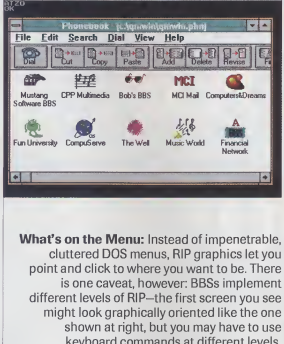
And you don't have to know whether the BBS you're calling supports RIP: Simply define RIPscrip as your default terminal emulation, and the program will automatically enable it for mouse use if the BBS supports it. Otherwise, the program falls back to standard ANSI emulation.

QmodemPro for Windows' icon-based dialing directory—which can also be viewed in list form—is designed for the online junkie. You can specify up to five alternate phone numbers for each system you call, include your name and password, designate a script file, and choose from more than 50 icons (including ones for commercial services like CompuServe and MCI). For the more organized cyber-surfer, QmodemPro for Windows lets you attach notes to each entry, group entries in categories, and even sort them by a variety of attributes.

**Fax Features** And as far as we know, QmodemPro for Windows is the only communications package to integrate some basic fax features—emphasis on *basic*. This is no WinFax Pro from Delrina, and you won't be able to fax from within other applications. But QmodemPro for Windows will let you send and receive text and graphics files, define and select a cover page—and it even keeps a log of all fax transmissions. The program also includes a fax viewer that lets you view, rotate, and zoom in on your faxes.

Another nifty feature that most of the other communications packages don't have is drag-and-drop file uploads. QmodemPro for Windows lets you select multiple files from the Windows file manager and drag them onto the Upload button for timesaving batch file transfers.

QmodemPro for Windows is a standout package—with everything that the other Windows communications programs offer in usability and flexibility, plus RIPscrip and fax support that make it a nice all-in-one solution for the online buff. SHYAMALA REDDY




**Connect in a Snap:** QmodemPro for Windows incorporates all the essentials of Windows-based communications. Just click on a button to launch a session, upload or download a file, toggle a capture file, change the terminal emulation or file-transfer protocol, change the baud rate and parity settings, start a macro, or disconnect.

**What's on the Menu:** Instead of impenetrable, cluttered DOS menus, RIP graphics let you point and click to where you want to be. There is one caveat, however: BBSs implement different levels of RIP—the first screen you see might look graphically oriented like the one shown at right, but you may have to use keyboard commands at different levels.

## FILEBOX

### QmodemPro for Windows

**System Requirements:** A 386 system or higher, 4MB RAM.

**Hard Disk Minimum:** 15MB.

**Modem Models Supported:** 170.

**Terminal Emulations Supported:** 31.

**The Competition:** Delrina's WinComm Pro comes the closest in its feature set.

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*Personal Information Manager v.1.0*

**New! SOFTWARE: GoldMine 2.5 vs. Maximizer 1.2**

**USABILITY:** *GoldMine is easier.*
**PERFORMANCE:** *GoldMine runs quicker.*
**TECHNOLOGY:** *Need workgroup features? GoldMine has 'em.*
**VERDICT:** *GoldMine is simply the best contact manager.*

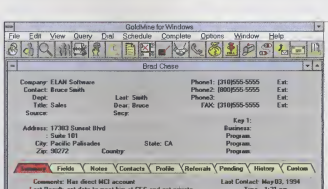
# Keep Your Contacts in Place

Selling is all about communication. It's about getting in touch with clients, making calls, having meetings, and keeping track of it all. Need a hand? The new Windows versions of Elan Software's GoldMine 2.5 for Windows and Modatech Systems' Maximizer 1.2 for Windows contact managers help you do it all better.

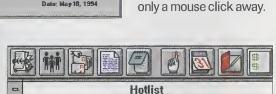
**Real Groupware** Few salespeople work alone, and GoldMine's real strength lies in its workgroup features. It isn't just "network-ready" like Maximizer. Both Maximizer and GoldMine have a group scheduler. Though Maximizer will search multiple employee calendars to find potential dates and times for a proposed meeting, GoldMine will also track resources, such as an overhead projector or a specific conference room. Only GoldMine analyzes resource use across time, delegates tasks, and shares progress reports among all workgroup members.

GoldMine's sales automation capabilities are top-notch, offering telemarket script-building. It also supplies time-analysis graphs and statistics. You can track sales prospects, forecasting future revenue and cash flow by individual or group contacts or by users.

Despite its power, GoldMine is easy to use: You can always see the key customer information—names, company, address, phone numbers—in the upper section of the contact screen. The lower section contains clickable file-tab folders for various subject groups, including notes, previous history, and attached documents. You can also design your own folders, incorporating new fields or reentering fields located in other folders.




**Pot of Gold:** One of GoldMine's strengths is a clear-but-expandable interface in which common fields—name, company, address, and phone numbers—are visible in the upper section of the contact screen. Thanks to a familiar metaphor in the lower section, other screens are only a mouse click away.




**Windows Galore:** All of Maximizer's windows are linked. Scroll to a contact name on your Clients list and specific notes will be displayed in the Notes window. In the Expenses window, you get a view of all expenses related to that client. Although Maximizer provides a flexible architecture, you end up suffering from window overload.

Most important, GoldMine is fast. It leaves the competition—Maximizer, PowerLeads, and SuperOffice—in the dust.

**Maximize Your Lists** Maximizer 1.2's main strength is its capability to present information simply and clearly, in a context that emphasizes comparison. Instead of Rolodex-style records like most contact managers, Maximizer relies mostly on tabular views: It lists fields across the top of the screen, with individual entries beneath. You can sort on any field. Unfortunately, this useful view is also Maximizer's greatest weakness, because you can't fit more than 6 fields across the average screen, even though a typical record could easily contain as many as 60.

Still, Maximizer is intuitive. Its robust search capabilities let you save lists for future reference. Automated fax support supplies a contact's address, dials the phone, transmits the document, and logs the results. You can customize Maximizer in numerous ways. In addition to a flexible calendar, it supports macros for complex tasks.

**The Winner** GoldMine 2.5 for Windows is clearly the superior contact manager, offering many advantages and no real drawbacks, while Maximizer for Windows is hampered by design limitations: It's easy to learn and offers solid features, but its multiple display windows clutter the screen.

Simply put, GoldMine is the best Windows contact manager. It's fast and easy to use, with features for tracking sales, resources, contacts, and communication. BARRY BRENESA

**FILEBOX**

**GoldMine vs. Maximizer**

**System Requirements:** A 386SX and 4MB of RAM for GoldMine; a 286 and 2MB of RAM for Maximizer.

**Hard Disk Minimum:** 4MB free for GoldMine; 3.5MB free for Maximizer.

**Main Competitor:** ACT.

**GoldMine 2.5**
$295 for single user; $895 for 5-user version
Elan Software Corp.
(800) 654-3526, (310) 454-6800
*Reader Service No. 616*

**Maximizer 1.2**
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## LANtastic 6.0 Beats Personal NetWare 1.0

# Time to Give In to Peer Pressure

**USABILITY:** *LANtastic smashes NetWare.*
**PERFORMANCE:** *LANtastic is faster on smaller networks.*
**TECHNOLOGY:** *LANtastic trounces Personal NetWare.*
**VERDICT:** *Unless you're a Big Red shop, get LANtastic.*

Until now, peer-to-peer network operating systems have been strictly kid's stuff, low-end solutions with limited functionality, scant security, minimal performance, and no interoperability to speak of. But no one could accuse the latest versions of Artisoft's LANtastic 6.0 and Novell's Personal NetWare 1.0 of being kiddy toys—these peer systems are all grown up and ready to take their place in enterprise-wide client/server environments.

**Groupware Galore** Although LANtastic 6.0 has added significant management and interoperability features, its major improvement is in the groupware arena. Like Microsoft Windows for Workgroups, the new LANtastic now includes an e-mail system and group scheduler.

While not as robust as a mainstream package such as Lotus' 'cc:Mail, LANtastic's Exchange Mail does include public and private mailing lists, an integrated spell-checker, address books, and filters.

The program's only drawback is that it doesn't support the Vendor Independent Messaging (VIM) or Microsoft's Messaging Application Program Interface (MAPI) standards—which puts a crimp in its interoperability—although separate modules will soon be available for MCI Mail and MHS-compatible mail systems.

Likewise, while the scheduling module allows you to create a meeting, invite other users, and find the best time available, it still forces you to switch to the mail module to receive and reply to meeting requests. Look for tighter integration in an upcoming rev.

The LANtastic 6.0 NOS is now completely modular, a boon for network administrators. You can specify which modules to load; if you don't need LANtastic's Share utility, for example, and don't want it wasting memory and processor effort, you can just dump the tool from your network setup files to optimize server performance.

Finally, LANtastic clients now come ready straight out of the box to talk to NetWare servers and Server Message Block (SMB) servers such as Microsoft's Windows NT, Windows for Workgroups, and IBM LAN Server. This makes LANtastic a NOS that's truly multicultural and interoperable.

LANtastic installs quickly and easily under Windows, and the program automatically adds a LANtastic group from which you can launch the LANtastic control panel.

**NetWare Lighter** In comparison, Personal NetWare's installation is counterintuitive and practically undocumented. It took us more than an hour to get the software installed and to get the network set up.

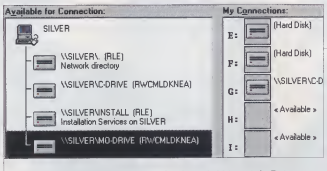
Nonetheless, Novell's successor to NetWare Lite is an adequate solution for exchanging files, and sharing drives and printers. Whether it's enough of a network for you depends on how much you really want from your NOS.

If you prefer to add your own mix of e-mail and group scheduling packages to your LAN, Personal NetWare may fit your office needs better.

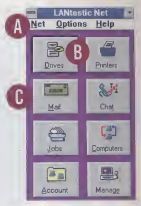
And, of course, since Personal NetWare is expected to ship with Novell DOS 7, which in turn will probably be bundled with NetWare 4.1, many of you will have access to Personal Netware without spending a penny extra. It's hard to argue with a deal like that.

**One at a Time** Personal NetWare does, however, lack the overall usability and integrated groupware of LANtastic 6.0. For example, Personal

*(continued on page 99)*




**Connect the Resources:** Click on LANtastic's Drives button in the control panel to see the screen above. This lets you view existing connections and set up new drive mapping by dragging and dropping resources onto drives.

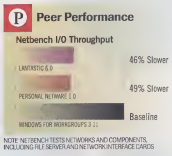



**A.** LANtastic's **intuitive control panel** puts resources and network services at mouse point.

**B.** Click a button to view and manage **drives and printers** on servers.

**C.** You can find send and receive fax capabilities in **Artisoft Exchange Mail.**

**Photo Finish:** Performance-wise, the two NOSs are practically tied. LANtastic was faster in our tests on smaller networks but ultimately it was edged out as more nodes were added.



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| • 512KB video memory | • 1MB video memory |
| • IBM Basic 101-Key Keyboard & Mouse | • IBM Enhanced 101-Key Keyboard & Mouse |
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| • VESA local bus video | • VESA local bus video |
| • 1MB video memory | • 1MB video memory |
| • IBM Enhanced 101-Key Keyboard & Mouse | • IBM Enhanced 101-Key Keyboard & Mouse |
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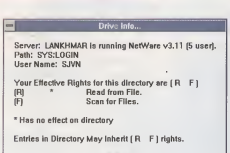
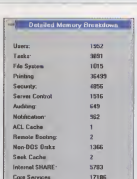
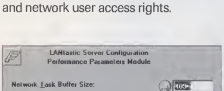


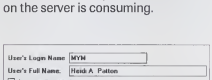

**Personal NetWare:** While it lacks the server-tuning facilities of LANtastic, Personal NetWare gives you more drive information, including server name and network user access rights.




**LANtastic:** The server control panel gives you an explicit breakdown of how much memory each module on the server is consuming.




**LANtastic:** You can fine-tune each server performance parameter with the keyboard or by using the mouse to "spin" the dials to the left of each value box.




**Personal NetWare:** An excellent user management structure lets you add users and set access rights and passwords.

*(continued from page 89)*
NetWare won't let you log on to more than one Personal NetWare workgroup at once. While this saves time by not requiring users to log on to multiple servers, it also detracts from the flexibility of the peer-to-peer model.

While you can switch resources from one workgroup to another by changing a server's workgroup or by using a router, both methods are cumbersome compared with LANtastic's direct log-in to multiple servers.

Needless to say, however, Personal NetWare has no problem connecting with NetWare servers. A Personal NetWare client can simultaneously maintain connections with both a Personal NetWare server and any brand of NetWare server from 2.x to 4.x.

**Resource Hog** Neither NOS is easy on memory: A LANtastic client/server program combination can take up as much as 103K, while a Personal NetWare client/server can gobble as much as 137K.

Your numbers will vary depending on the exact combination of programs. For example, while LANtastic has an internal program that duplicates MS-DOS's SHARE.EXE command functionality, some applications, such as Lotus Notes 3.0a, won't work with LANtastic's SHARE program. So, in some circumstances, you may need the DOS version anyway.

If you're familiar with the full-boat, server-based versions of NetWare, you'll probably have an easier time. But you won't find much compelling about Personal NetWare, aside from adding a few peer-to-peer capabilities to your server-based environment.

If you need to talk to both NetWare and non-NetWare servers, or you just want the convenience of integrated mail and scheduling, then LANtastic 6.0 is clearly the best choice.

STEVEN J. VAUGHAN-NICHOLS

## FILEBOX

### LANtastic 6.0 vs. Personal NetWare 1.0

**Starter Kit:** For just more than $500, you get all the hardware, including network cards and cable, and software you need to connect two users with LANtastic. Personal NetWare has no starter kit; it is sold in single-user packs, as well as 5-user versions, with no hardware.

**System Requirements:** Both require a PC with an 8088 processor or higher and 4MB of RAM.

**Hard Disk Footprint:** LANtastic 6.0 requires a maximum of 7.7MB of hard disk space; Personal NetWare needs 5MB.

**Memory Usage:** A fully loaded client/server combination requires 103K for LANtastic and 137K for Personal NetWare.

**Don't Tell the Boss:** Personal NetWare comes with the best network game we've seen: NetWars. A 1970s arcade-style space fantasy with surprisingly goodgraphics, NetWars lets you and three co-workers cruise through the galaxy blasting away at each other and at enemy spacecraft. Beats Windows for Workgroups' Hearts game, hands down.

$719, LANtastic 6.0 Starter Kit
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(800) 233-5564
*Reader Service No. 621*

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$395, 5-user version
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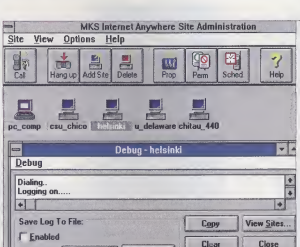
**News Reader** Usenet news is analogous to thousands of bulletin boards where users can post information, opinions, and questions about anything from the amusing to the absurd. One minute you're downloading your favorite Sierra Nevada ale recipe (alt.beer) and the next, you're arguing about Mr. Spock's excessive earwax (rec.arts.startrek.info).

MKS Internet Anywhere's News Reader interface makes trolling through these uncharted newsgroup waters easy, with novice-friendly navigation buttons. The same interface guides you through subscribing to and reading postings in any of thousands of available newsgroups. Since newsgroups are created almost daily, the News Reader alerts you to these new groups each time you dial in and offers to add the new groups to your subscription list.

**Beats Snail Mail** In addition to viewing incoming and sending outgoing mail messages in the Mail Reader interface, you can customize the way a message is displayed; you can organize and save mail into folders; and you can update a handy, personal address book that stores your pen pals' frequently used electronic addresses. Here's one smart money-saving feature: The software also includes a Scheduler, which lets you specify when to dial in to your Internet provider. Do all your writing offline, then use the Scheduler to trade e-mail and postings late at night or on weekends, when access providers' calling rates are cheap.

Speaking of access providers, you'll still have to find one to use MKS Internet Anywhere—this is no all-in-one package. Mortice Kern Systems makes it as painless as possible by shipping its software with a list of Internet Service providers.

If you're dying to join the Internet fray cheaply and easily, MKS Internet Anywhere will satisfy your appetite, at least for now. Once you're hooked on the Net, you'll start to hunger for access to other services, such as ftp and telnet, at which point you'll have to find a new front end. Until then, MKS Internet Anywhere delivers on its promise of a usable, intuitive, Internet interface for e-mail and newsgroup access—plus it's downright fun to use. RICH SCHWERIN




**Overseeing Your Site:** Add your desktop to the multitude of global Internet sites with ease, setting a site name, modem data, and passwords from MKS Internet Anywhere's Control Center window. From this interface you can connect to other Internet sites; the program's administration module also includes a handy debugger that tracks your modem progress.

**Electronic Flea Market:** Usenet news seems limitless in topic and scope, from Antarctic bird discussion to used-book sales to investment tips, but MKS Internet Anywhere makes reading and posting replies as easy as clicking a mouse button.

## FILEBOX

### MKS Internet Anywhere

**System Required:** MS-DOS system running Windows 3.1 or later.

**Required Network Connection:** UUCP only; no Serial Line Internet Protocol (SLIP) or Point-to-Point Protocol (PPP).

**Hard Disk Space Required:** At least 6MB.

**Estimated Number of New Internet Users per Month:** 150,000.

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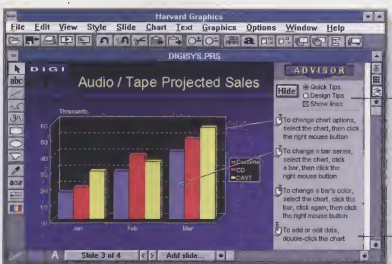


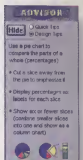


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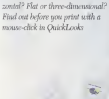

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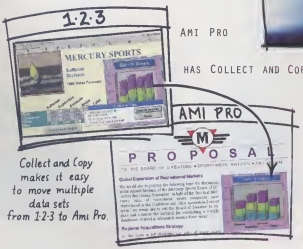


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# Best 200


**Systems**

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**Peripherals**

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## Hardware Buyer's Superguide

Cut-throat price wars should make hardware buying decisions easier, right? Wrong. As prices plummet, bringing the best new technologies in line with your budget, picking products becomes harder than ever. Which one's fastest? Will setting it up drag on until next year? Only when you know the answers to questions like these can you make sense of oh-so-low prices. That's where the next 85 pages come in. First, we identified 21 product categories that can benefit businesses of any size. Next, our editors and ZD Labs spent four months testing hundreds of products to identify the very best 200. The result: Every single product here is a winner, and they're fit to meet the core needs of any business.

Are there stellar products we couldn't include here? Sure. New stars come our way every day, many of which fall just outside the bounds of our product categories. Examples: Apple's slick new digital camera, Nokia's PC Card (the first cellular modem to matter), Cyrix's 386-to-486 clock-doubled upgrade chip, Visioneer's PaperMax scanning solution, and National Semiconductor's wireless AirShare products. Look for coming reviews on standout products that didn't quite fit this year's categories.

The top-rated products in all 21 categories aced our tests, but what if your business priorities don't match our scoring model? That's where *PC Computing*'s Decision Makers come in. By following separate Decision Maker branches, Adams in accounting and McGillicuddy in marketing get the products they need.

And we do mean the best products. Just look. . . .

**ON THE DESKTOP:** Hold on to your hat, or Dell's rocket-fast **Dimension XPS P90** will blow it off.

**IN THE WORKGROUP:** The printer we want is HP's untiring **LaserJet 4Si MX.** It flew through our tests.

**ON THE BLACKTOP:** There are shrinking notebooks, and then there is Toshiba's incredible pint-sized **Portégé T3400CT.**

PHOTOGRAPHS BY MARK JOHANN

Best
200
Best

Best 200

Pentium Power, Double-Time Desktops, Petite Portables . . .

# Systems

**SYNOPSIS**


**33MHz 486 PCs:** *Entry level at rock-bottom prices.* **108**

**66MHz 486 PCs:** *Check out speedy Windows desktops.* **112**

**PENTIUM PCs:** *They flew in our Windows speed tests.* **120**

**PENTIUM SERVERS:** *Our winner was a bona fide hot rod.* **126**

**COLOR NOTEBOOKS:** *We found better batteries and color.* **130**

**COLOR SUBNOTEBOOKS:** *They tested light and bright.* **140**

**MONOCHROME SUBNOTEBOOKS:** *These are under five pounds!* **146**

**EDITOR'S CHOICE:** *Dream multimedia and a digital Uzi.* **151**


Looking for a powerful new PC? Get this: Almost anything you can do on the desktop, you can do on the blacktop with this year's crop of notebooks and subnotebooks. To achieve an across-the-board rating of PCs, we looked at this year's whole smorgasbord of system options, from truly feather weight subnotebooks to maxed-out file servers. On the desktop, where there's no such thing as too fast or too cheap, you can choose from fast, faster, and "don't blink." As always, last season's hottest box is now this year's hand-me-down. The entry-level system for 1994 is a 33MHz 486, which can cost you less than $1,800.

The best desktop buy: a clock-doubled 66MHz. Look at Digital Equipment Corp.'s DECpc LPx 466d2 for the definitive word on how to build a top-notch PC at a rock-bottom price with all of the right peripherals and upgrade options.

And then there's the first wave of Pentium PCs, which sailed through our benchmark tests. Take your choice of processor speeds, local buses, and bundled graphics cards—but study the differences between systems. Not every manufacturer has mastered the subtleties of Pentium design.

On the road, where there's no such thing as too fast or too thin, you can choose from light, lighter, and "floats like a butterfly." We found plenty of personality in this year's 23 portables, where there are still big differences in performance and style between the leading contenders. The top notebooks match an active-matrix screen with a fast processor, local-bus graphics adapter, I/O options, and features like infrared connections. Or, for a lot less money, you can get a dual-scan passive-matrix screen with a single PCMCIA slot.

The new subnotebooks, starting at 2.9 pounds, are like a parade of pristine diet center graduates, with scaled-down keyboards, exotic pointing devices, and smaller batteries that run for five hours. But expect trade-offs affecting price, usability, or both.

At the other end of the spectrum, there are network file servers, which can never be too fast or too expandable. For demanding client-server jobs, the processor is everything. But for most networks, the bargain solution can still be a fully loaded 66MHz 486 system. You have more choices now than ever. ED BOTT

**A RAINBOW ROAD WARRIORS:** For graphics and Windows, the color displays on powerful portables like **Toshiba's T4800CT** can't be beat.

**B NETWORK QUARTERBACKS:** Expandability is key for servers—that's why **ALR's Evolution V** server offers 13 drive bays.

**C UP CLOSE AND PERSONAL: Acer America's Power Pentium** lets you get to its innards in no time.

**D PETITE POWER:** Monochrome subnotebooks like **HP's OmniBook 430** need handy peripherals, too—look for PCMCIA slots.

PHOTOGRAPHS BY MARK JOHANN

A

When you're on the road again, you want your notebooks light and bright.

B

When you're in the office, nothing beats state-of-the-art Pentium desktops

C

and souped-up, ready-to-grow systems that expand when you demand.

D

# Last Year's Racehorses, This Year's Workhorses

The current crop of 33MHz 486 systems are the sweet spot of the bargain PC market. Vendors are offering more RAM, faster graphics, and larger hard drives to differentiate themselves from the competition. Instead of caveat emptor, the buyer is in the driver's seat.

With applications requiring more disk space and CPU cycles, we upped our minimum requirements for low-cost PCs this year. No SX chips need apply. Qualifying PCs have a 33MHz 486DX with 8MB of RAM, at least a 340MB hard disk, 1MB of VRAM on the video card, and either VL-Bus or PCI. These criteria provide the necessary horsepower to run Windows without making you wait forever for applications to load and screens to redraw. These winners will keep you humming throughout the day without destroying your budget. Our top scorers were very closely matched.

**Factors and Weights** Would it surprise you that price is the most important criteria? At 25 percent, it represents the single biggest factor in our results. Price isn't everything, however. Without a minimum standard of performance, a $1,200 486DX with 4MB of RAM and a 100MB hard disk would be your best buy. Unfortunately, all of your savings would disappear in lost productivity. Performance criteria make up almost half of the total score. Overall Windows performance is the most important performance indicator at 15 percent. We weigh CPU/memory performance, disk performance, and video performance at 10 percent each. Our results show that these systems work fine as entry-level machines. The two other heavily weighted factors, at 10 percent each, are mechanical design and service and support. With the proliferation of third-party service organizations, even the smallest clone manufacturer can reach out and help you from long distance. Finally, documentation and ease of installation each account for 5 percent of the total score.

**How We Tested** We emphasized business applications tests, starting with Winstone, a collection of tasks running under 12 leading Windows applications. *PC Computing* Labs ran an out-of-the-box series of tests on each machine to get a portion of the installation score. Next, we changed the system configurations to level the playing field and repeated Winstone to get a baseline understanding of how well the systems run Windows applications. We then ran PCbench—a DOS-based benchmark that measures individual components such as the memory subsystems—and Winbench, to stress them under Windows. We also ran the Coretest benchmark to help determine the disk performance scores.

Systems are more than boxes with cards and chips. We opened each one to check its assembly. We were impressed with the overall quality of design, but took particular notice when a system's SIMM sockets were easy to find and change. We also added points for easy-access drive bays, a generous number of available slots, and ZIF sockets to upgrade a system (see "Usability Close-Up" on page 109). When you're desperately trying to find the latest driver for your system, having BBS, CompuServe, and toll-free phone support is essential—so much so that we've come to expect these services and take off points when a vendor doesn't provide them. When you're buying an entry-level system, quick-start manuals and quick-reference cards are also necessities. You may understand the inner workings of the system, but do your colleagues? CHRIS SANDLUND

## Market Trends: 33MHz 486 PCs

1. 33MHz PCs As Entry-Level Desktops
2. Converging 33MHz and 66MHz PC Prices
3. Pentium Price Free-Fall in 1994

**One Price Leads to Another:** Extremely dramatic price decreases for Intel's Pentium chip have had a domino effect: Thank the Pentium for this year's crop of ultracheap 33MHz 486 desktop systems. They're big bargains.

## DECISION MAKER

HOW TO BUY THE BEST **33MHZ 486 PC** FOR YOUR BUSINESS

| 1 Choose the factor most important to you. | 2 Choose the next most important factor. | 3 What else is important? | 4 For your needs, the best product to buy is . . . |
|---|---|---|---|
| Windows Performance | Disk Performance | CPU/Memory Performance | Dell OptiPlex 433MXV |
| | | Mechanical Design | Dell OptiPlex 433MXV |
| | Price | Mechanical Design | Axik Ace Cache 486-33VG |
| | | Disk Performance | Axik Ace Cache 486-33VG |
| Price | Service & Support | Windows Performance | DECpc LPx 433dx |
| | | Disk Performance | AST Bravo LC 4/33 |
| | CPU/Memory Performance | Mechanical Design | AST Bravo LC 4/33 |
| | | Disk Performance | AST Bravo LC 4/33 |
| Service & Support | Windows Performance | Mechanical Design | Dell OptiPlex 433MXV |
| | | Price | DECpc LPx 433dx |
| | Mechanical Design | CPU/Memory Performance | DECpc LPx 433dx |
| | | Price | DECpc LPx 433dx |

PC Best

### 33MHz 486 PC

## DECpc LPx 433dx

**PRICE:** Aggressively priced at $1,848, Digital Equipment Corporation's DECpc LPx 433dx is at the low end of the range for systems tested.

**WINDOWS PERFORMANCE:** Fastest system we tested without a local-bus video card.

**CPU PERFORMANCE:** A screamer no matter which way you slice it—tied for second fastest in its category for raw CPU and memory performance.

**DISK PERFORMANCE:** DOS-based benchmarks drag it down. Local-bus IDE would make it unstoppable.

**MECHANICAL DESIGN:** Plenty of slots, bays, and cache—all in the right places. One of our highest scorers for mechanical design.

**DECpc LPx 433dx** / Digital Equipment Corp. / (800) 722-9332 / (508) 493-5111 / $1,848
*Circle No. 617 on Reader Service Card*

PHOTOGRAPH BY MARK JOHANN

# Best 200 Systems

## 33MHz 486 PCs

| Rank | Product | Pros & Cons | Price 25%* | Windows Performance 15% | CPU/Memory Performance 10% | DOS Performance 10% | Video Performance 10% | Mechanical Design 10% | Service & Support 10% | Documentation 5% | Ease of Installation 5% | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pc Best 1 | **DECpc LPx 433dx**<br>Digital Equipment Corp.<br>(800) 222-9332<br>$1,848<br>*Reader Service No. 651* | **Pros:** Great price, killer service and support.<br>**Cons:** Average disk and video performance. | 9.2 | 9.2 | 9.2 | 8.4 | 8.2 | 9.3 | 9.9 | 10 | 10 | **91.8** |
| 2 | **OptiPlex 433MXV**<br>Dell Computer<br>(800) 289-3355<br>$2,757<br>*Reader Service No. 652* | **Pros:** Blazingly fast multimedia machine.<br>**Cons:** Relatively high price. | 7.5 | 10 | 10 | 10 | 8.5 | 8.8 | 9.6 | 10 | 10 | **90.7** |
| 3 | **Ace Cache 486-33VG**<br>Axik Computer<br>(800) 234-2945<br>$2,198<br>*Reader Service No. 653* | **Pros:** Great design, performance, and price.<br>**Cons:** Need to verify video drivers during install. | 8.5 | 9.3 | 8.9 | 9.5 | 8.7 | 9.4 | 9.0 | 9.4 | 9.0 | **89.9** |
| 4 | **Micron 433VL Magnum**<br>Micron Computer<br>(800) 438-3343<br>$1,899<br>*Reader Service No. 654* | **Pros:** Well designed, fast CPU and disk systems.<br>**Cons:** Slow video performance. | 9.0 | 8.8 | 9.2 | 9.3 | 7.6 | 9.1 | 9.1 | 8.2 | 9.0 | **88.6** |
| 5 | **Insight VL 486DX-33**<br>Insight Direct<br>(800) 755-3875<br>$2,099<br>*Reader Service No. 655* | **Pros:** Decent performance and great documentation.<br>**Cons:** Surprisingly slow video for VL-Bus system. | 8.7 | 8.6 | 8.9 | 8.7 | 7.9 | 8.9 | 8.7 | 10 | 9.0 | **87.3** |
| 6 | **Bravo LC 4/33**<br>AST Research<br>(800) 876-4278<br>$1,836<br>*Reader Service No. 656* | **Pros:** Easiest to install, great support.<br>**Cons:** Slow at Windows tasks. | 9.2 | 7.4 | 8.7 | 8.0 | 7.5 | 8.6 | 9.9 | 9.4 | 10 | **86.5** |
| 7 | **Gräfika 4V2/D33**<br>DTK Computer<br>(800) 289-2385<br>$2,289<br>*Reader Service No. 657* | **Pros:** Killer video subsystem.<br>**Cons:** Motherboard shoehorned into case. | 8.2 | 8.2 | 8.8 | 8.9 | 10 | 7.6 | 9.3 | 8.8 | 7.0 | **85.3** |
| 8 | **Ambra 486DX-33**<br>Zeos Int'l<br>(800) 554-5218<br>$1,744<br>*Reader Service No. 658* | **Pros:** Best price, generous hard disk.<br>**Cons:** Slow Windows performance. | 9.4 | 7.8 | 8.6 | 8.4 | 7.3 | 7.8 | 9.1 | 8.8 | 8.0 | **84.8** |
| 9 | **AT&T 3230**<br>AT&T Global Information<br>(800) 637-2800<br>$2,250<br>*Reader Service No. 659* | **Pros:** DOS performance shines.<br>**Cons:** Video system drags Windows performance down. | 8.2 | 7.9 | 8.4 | 8.6 | 7.2 | 8.2 | 9.4 | 8.8 | 10 | **83.6** |
| 10 | **Evolution IV 4/33**<br>Advanced Logic Research<br>(800) 444-4257<br>$2,716<br>*Reader Service No. 660* | **Pros:** Outstanding service and support.<br>**Cons:** Priced higher than many others. | 7.6 | 8.8 | 7.0 | 8.2 | 8.3 | 8.4 | 9.9 | 8.8 | 10 | **83.4** |

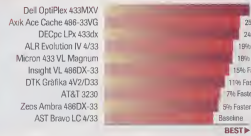
*PERCENTAGES REFLECT THE WEIGHT OF EACH FACTOR IN TOTAL SCORE. FACTORS ARE SCORED ON A SCALE OF 1 TO 10. TOTAL SCORES ARE NORMALIZED TO A SCALE OF 1 TO 100. NOTEWORTHY SCORES ARE HIGHLIGHTED IN RED.

## Usability Close-Up
## Micron's Loadable Magnum

Micron designed an outstanding layout for the **433 VL Magnum**. The CPU and SIMM sockets are easily located at the front of the system. Popping in a Pentium upgrade is as simple as a quick pull of the ZIF socket's lever.

**Easy Upgrades** SIMMs and chips slip into the Magnum easily.

## Performance Spotlight: Windows Tests




**Performance scores** (above) are based on Windows, CPU, disk, and video tests.

NOTE: WINDOWS TESTS MEASURE APPLICATIONS, GRAPHICS, AND DISK PERFORMANCE

PHOTOGRAPH BY ARNOLD TOSKELO

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*Shorten the distance between you and your LAN—make the LAN Distance call.*

| How they compare: | IBM LAN Distance | DCA Remote LAN Node | Shiva LANRover | Novell NetWare Connect |
|---|---|---|---|---|
| **Connectivity Options** | | | | |
| Remote to LAN | Yes | Yes | Yes | Yes |
| Remote to Remote | Yes | No | No | No |
| LAN to Remote | Yes | No | No | Yes |
| LAN to LAN | Yes | No | No | Yes |
| **Remote Connectivity** Sync, ISDN, X.25 (In addition to ASYNC) | Yes | No | No | Yes |
| **LAN Application Interfaces** NetBIOS, NetBEUI, 802.2 (In addition to IP and IPX) | Yes | Yes | Yes | No |
| **Security** WS Addr., Sec. Admin., Logon Policies, Logon Day/Time (In addition to User ID, Password and Callback) | Yes | No | No | No |

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IBM®

# Bigger, Better, Faster—486s Meet Many Needs

Last year's powerhouse PCs are this year's workhorses. For anything but the most demanding Windows applications, these machines motor through your daily chores with steady precision. While prices have drifted somewhat lower than last year's, vendors now offer significantly greater bang for the buck—so much more that we had to raise the standard for the minimum configuration for *PC Computing*'s Best 200 testing. Our two top scorers fought tooth-and-nail for top honors.

We've grown tired of watching Windows swap out to our hard disks. So we doubled the amount of RAM required from 8MB to 16MB to keep that 66MHz 486DX2 humming. We also increased the minimum drive size to 340MB, either IDE or SCSI-2. Where 1993's minimum system had a 14-inch monitor, we now expect 17-inchers. VL-Bus or PCI local bus is no longer a bonus point, it's a requirement.

**Factors and Weights** Price continues to be the dominant factor in 486 buying decisions and is weighted at 25 percent. Besides the absolute dollar amount, we added extra points for significantly larger hard drives and any extra hardware or software bundles. We buy these machines to run Windows, so they had better run it well. Our combination of Winbench and Winstone tests creates our Windows performance rating, which accounts for 15 percent of the total score. We used PCbench to determine the CPU/memory performance score, which contributes another 10 percent.

As you'll see with our winner, disk performance is a determining factor that tells us about the consequences of system design choices: Even when it represents only 10 percent of the final score, the significant spread on the combination of PCbench's Disk Score, Winbench's Disk Winmark, and Coretest proves decisive. Size of the cache, position of the SIMMs, inclusion of a ZIF socket, as well as the number of slots and bays, make up the mechanical design score for another 10 percent. We also give 10 percent each to service and support and video performance, and 5 percent each for documentation and ease of installation.

**How We Tested** ZD Labs ran each machine through a series of benchmark tests. First, we assembled the machines just as they came from the factory and ran Winstone —our real-world Windows application test suite. Then we standardized the configurations by limiting the number of drivers that load at startup and repeated the test suite. The Winstone benchmark is based on 12 common applications, including WordPerfect 5.2 for Windows, Microsoft's Access 1.1, Borland's Quattro Pro 1.0 for Windows, Aldus's PageMaker 5.0, and CorelDraw 4.0. We also tested system components—including video—with PCbench under DOS and Winbench under Windows. Finally, we ran Coretest to test the disk subsystem.

After we finished the benchmarks, we pulled the cases apart and took a look at the systems' guts. Having worked on thousands of systems over the years, we gave extra credit to those that had easy-to-access drive bays, SIMMs, and slots. We noted screwless cases (see "Usability Close-Up," on page 114) and the increasing number of local-bus slots. BBSs, CompuServe, and toll-free phone support have become necessary. Companies without these services lost points.

After looking through all of the documentation, we think things are improving. Almost all of the vendors give you a list to explain those inscrutable error messages, and quick-start manuals and quick-reference cards are becoming standard. CHRIS SANDLUND

## Market Trends: 66MHz 486 PCs

1. Prices Remaining Cheap for 66s in '95
2. 66MHz PCs Emerging as Entry-Level Picks
3. No Dramatic 486 Price Drops in 1995

**Pentiums Plummeting Faster:** Pentium prices have fallen nearly 75 percent in less than two years. But 66MHz 486 PCs, like 33MHz 486 systems, have taken twice as long to fall less than 70 percent. The trend should continue.

## DECISION MAKER

HOW TO BUY THE BEST **66MHz 486 PC** FOR YOUR BUSINESS

| 1 Choose the factor most important to you. | 2 Choose the next most important factor. | 3 What else is important? | 4 For your needs, the best product to buy is . . . |
|---|---|---|---|
| Windows Performance | Disk Performance | CPU/Memory Performance | DTK Grafika 4V2/T66 |
| | | Mechanical Design | DTK Grafika 4V2/T66 |
| | Price | Mechanical Design | DTK Grafika 4V2/T66 |
| | | Disk Performance | Comtrade Express VL-Bus |
| Price | Service & Support | Windows Performance | DECpc LPx 466d2 |
| | | Disk Performance | HP Vectra VL2 4/66 PC |
| | CPU/Memory Performance | Disk Performance | DECpc LPx 466d2 |
| | | Mechanical Design | DECpc LPx 466d2 |
| Service & Support | Windows Performance | Mechanical Design | Dell Dimension XPS 466V |
| | | Price | DECpc LPx 466d2 |
| | Mechanical Design | CPU/Memory Performance | DECpc LPx 466d2 |
| | | Price | DECpc LPx 466d2 |

PC Best

### 66MHz 486 PC

# DECpc LPx 466d2

**PRICE:** For $2,248, the DECpc LPx 466d2 is full-featured and backed by sterling service and support.

**WINDOWS PERFORMANCE:** This system's respectable Winstone rating was balanced by fair disk and video scores in our tests.

**CPU/MEMORY PERFORMANCE:** Solid performance could be boosted by faster RAM cache.

**DISK PERFORMANCE:** The system's Achilles' heel. Most disk-based tests weren't outstanding. A faster controller on the VL-Bus would help.

**MECHANICAL DESIGN:** All of the upgrade options are done right—including a ZIF socket.

**DECpc LPx 466d2** / Digital Equipment Corp. / (800) 722-0332 / (508) 493-5111 / $2,248
*Circle No. 661 on Reader Service Card*

PHOTOGRAPH BY MARK JOHANN

# Best 200 Systems

## 66MHz 486 PCs

| Rank | Product | Pros & Cons | Price 25%* | Windows Performance 15% | CPU/Memory Performance 10% | Disk Performance 10% | Video Performance 10% | Mechanical Design 10% | Service & Support 10% | Documentation 5% | Ease of Installation 5% | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PC Best 1 | **DECpc LPx 466d2**<br>Digital Equipment Corp.<br>(800) 722-9332<br>$2,248<br>*Reader Service No. 661* | **Pros:** Rock-bottom price; high-end service and dependable, accessible support.<br>**Cons:** Slow disk performance is this system's Achilles' heel, balanced in performance tests overall. | 10 | 8.9 | 9.3 | 7.2 | 8.8 | 9.2 | 9.4 | 10 | 10 | **92.3** |
| 2 | **Express VL-Bus Professional 66**<br>Comtrade Electronics<br>(800) 969-2123<br>$2,675<br>*Reader Service No. 662* | **Pros:** Screaming performance, monster hard drive, very easy to configure, strong video showing.<br>**Cons:** No onsite support. Overall, support policies don't match those of the competition. | 8.9 | 9.8 | 9.9 | 8.4 | 10 | 8.8 | 8.1 | 9.4 | 10 | **91.9** |
| 3 | **Gateway P4D-66**<br>Gateway 2000<br>(800) 846-2000<br>$2,495<br>*Reader Service No. 663* | **Pros:** Good performance out of the box. We were extremely impressed with how easy the setup was.<br>**Cons:** One-year warranty falls short of some others, disk performance not as good as rest of system. | 9.3 | 9.3 | 9.5 | 7.3 | 8.5 | 9.3 | 9.1 | 10 | 10 | **90.9** |
| 4 | **Zeos 486DX2-66**<br>Zeos Int'l<br>(800) 554-5218<br>$2,995<br>*Reader Service No. 664* | **Pros:** Good Windows performance times, though disk tests weren't fastest.<br>**Cons:** Installation problems cost us some time. Other systems were clearly easier to set up. | 8.5 | 9.8 | 9.4 | 7.6 | 8.2 | 8.8 | 8.7 | 9.4 | 9.0 | **87.9** |
| 5 | **CompuAdd C466D**<br>CompuAdd Computer<br>(800) 288-8500<br>$3,773<br>*Reader Service No. 665* | **Pros:** Best Windows applications performance, flew through our Winstone tests, CPU performance was near the top.<br>**Cons:** Like a few others, this system goes for a high price. Most 486 desktops are cheaper. | 7.4 | 10 | 9.6 | 7.6 | 9.1 | 9.7 | 8.7 | 8.8 | 10 | **87.6** |
| 6 | **AcerPower 8000T**<br>Acer America Corp.<br>(800) 366-2237<br>$3,345<br>*Reader Service No. 666* | **Pros:** Solid performer, drop-dead easy to install, no headaches during setup.<br>**Cons:** Split-tower case design was OK, but not perfect. Disk performance wasn't quite up to speed with other components. | 8.1 | 9.4 | 9.6 | 7.5 | 8.3 | 9.1 | 9.2 | 8.8 | 10 | **87.5** |

*PERCENTAGES REFLECT THE WEIGHT OF EACH FACTOR IN TOTAL SCORE. FACTORS ARE SCORED ON A SCALE OF 1 TO 10. TOTAL SCORES ARE NORMALIZED TO A SCALE OF 1 TO 100. NOTEWORTHY SCORES ARE HIGHLIGHTED IN RED.

*(table continued on page 119)*

### Usability Close-Up
### Take It All Off

One thing is for sure when it comes to desktop users: They hate painful, clumsy, upgrade routines. Some system vendors have been slow to come up with better designs for easier upgrades. Surprisingly, many desktop systems still seem to be aimed at contortionists. There are no screws loose at Hewlett-Packard, where they rethought how to attach enclosures. Just slide two simple brackets sideways on the *front* of the **Vectra VL2 4/66 PC** and slide the cover forward off its tracks. No screws to lose, no need to turn your system around. It's one of those little changes that makes you hit your forehead and say, "Now, *that* makes sense." We're all in favor of such smarts.

**Hood-Popping Pleasure** Two basic brackets let you get at the Vectra VL2 4/66 PC's guts with grace and ease.

PHOTOGRAPH BY ARNOLD TIGSELD

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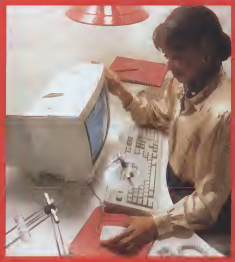

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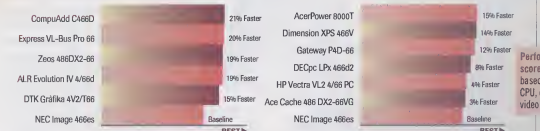
## 66MHz 486 PCs *(continued)*

| Rank | Product | Pros & Cons | Price 25%* | Windows Performance 15% | CPU/Memory Performance 10% | Disk Performance 10% | Video Performance 10% | Mechanical Design 10% | Service & Support 10% | Documentation 5% | Ease of Installation 5% | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | **Gräfika 4V2/T66**<br>DTK Computer<br>(800) 289-2385<br>$3,450<br>*Reader Service No. 667* | **Pros:** Cached disk drive has killer speed, most other systems' disk speeds paled in comparison. This one also posted blistering CPU speed scores.<br>**Cons:** Poor upgradability contributed to the mechanical design score. | 7.8 | 9.5 | 10 | 10 | 8.1 | 8.2 | 8.9 | 8.8 | 8.0 | **87.4** |
| 8 | **Ace Cache 486DX2-66VG**<br>Axik Computer<br>(800) 234-2945<br>$2,898<br>*Reader Service No. 668* | **Pros:** Good physical design, fairly easy installation routine.<br>**Cons:** Some of the slowest hard disk scores, although the other performance scores were fair. | 8.5 | 8.5 | 9.0 | 7.2 | 8.6 | 9.4 | 9.1 | 9.4 | 9.5 | **86.8** |
| 9 | **Dimension XPS 466V**<br>Dell Computer<br>(800) 289-3355<br>$4,067<br>*Reader Service No. 669* | **Pros:** Good performance, especially in Windows tests. Documentation is lucid and complete, but you won't need it during the supereasy setup routine.<br>**Cons:** High price for a desktop 486. | 7.0 | 9.4 | 9.8 | 7.6 | 8.8 | 9.3 | 9.1 | 10 | 10 | **86.2** |
| 10 | **Image 466es**<br>NEC Technologies<br>(800) 388-8888<br>$3,352<br>*Reader Service No. 670* | **Pros:** Largest hard drive, though disk performance wasn't impressive.<br>**Cons:** Slow with Windows applications during our Winstone tests. In disk tests, overall performance was only fair. | 8.0 | 8.2 | 8.7 | 7.4 | 8.5 | 9.1 | 9.4 | 10 | 9.5 | **85.2** |
| 11 | **Vectra VL2 4/66 PC**<br>Hewlett-Packard<br>(800) 752-0900<br>$3,802<br>*Reader Service No. 671* | **Pros:** Service with a smile. Documentation was very well organized and lucid.<br>**Cons:** Middling video performance, disk scores weren't as good as most, either. | 7.3 | 8.6 | 9.1 | 7.3 | 8.2 | 8.7 | 9.4 | 10 | 9.5 | **83.6** |
| 12 | **Evolution IV 4/66d**<br>Advanced Logic Research<br>(800) 444-4257<br>$3,898<br>*Reader Service No. 672* | **Pros:** Cranks Windows, posted some of the highest scores running Windows applications.<br>**Cons:** Doesn't have standard RAM cache, disk performance was ranked as fair. | 7.1 | 9.8 | 9.0 | 7.4 | 8.2 | 7.4 | 9.5 | 8.8 | 9.0 | **82.9** |

*PERCENTAGES REFLECT THE WEIGHT OF EACH FACTOR IN TOTAL SCORE. FACTORS ARE SCORED ON A SCALE OF 1 TO 10. TOTAL SCORES ARE NORMALIZED TO A SCALE OF 1 TO 100

### Performance Spotlight: 66MHz 486 PC Windows Application Tests




Performance scores (above) are based on Windows, CPU, disk, and video tests.

NOTE: WINDOWS TESTS MEASURE APPLICATIONS, GRAPHICS, AND DISK PERFORMANCE.

# Dream Machines, Let-Me-At-'Em Prices

Pentium systems have arrived. Despite initial low supplies and heat dissipation problems, this new processor is taking over corporate desktops. Why? It's not only fast, but systems that use it are priced to go. The systems we tested range in price from around $3,400 to $5,000—about the same as a 66MHz 486 cost a year ago. If prices keep dropping like this, the Pentium will be far-and-away the hottest processor this fall.

Which one do you want on your desk? If you're a speed demon, you'll crave Dell Computer's Dimension XPS P90. At $4,499, it's a bit more expensive than you'd pay for every desktop in your office, but its performance is unmatched. The more time we spent with the Dimension, the more we wanted to own it. Close on the Dimension's heels is another screamer, Micron Computer's P90PCI PowerStation, which lists for only $4,199. What do these two systems have in common that makes them so fast? A 90MHz Pentium chip. The 66MHz systems can't match the speed.

Honorable mention should go to two more vendors: Polywell Computers, for its $4,185, 66MHz Poly 586PT, and Blackship Computer Systems, for its $3,395, 60MHz BLK P-60. The drop in price you see from 66MHz to 60MHz is reflected in a drop in performance: Although very fast, the BLK P-60 just couldn't keep up with the Poly Pentium.

Next to performance, price is the crucial issue. What do you get for these prices? The systems that qualified for our tests are powered by 60MHz, 66MHz, or 90MHz Pentium processors, and have 16MB of RAM and at least a 424MB hard disk. Most include a PCI or VL-Bus for 132MB-per-second throughput. The systems that met our criteria underwent our most rigorous benchmark tests: Coretest, PCbench, Winbench, and Winstone. Winstone, our Windows application test suite, was particularly telling.

**Factors and Weights** Here's how we ranked the systems. Price and performance lead the pack in importance. Price alone accounts for 25 percent of a system's total score. And performance accounts for a total of 45 percent, broken down as 15 percent for Windows performance and 10 percent each for raw CPU/memory performance, disk performance, and video performance. Mechanical design accounts for 10 percent, as does service and support. Documentation and ease of installation each make up 5 percent of the final score.

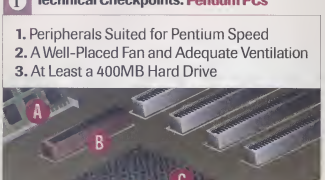
**How We Tested** *PC Computing* Labs used an assortment of benchmarks and measures to evaluate these systems. We measured performance with our benchmark tests. Together, these four suites run a system through sophisticated component-level tests and real-world application tests.

We rated mechanical design by ranking the system's expansion slots, the ruggedness of the case, how easy it was to open and access components inside, and how easy it was to upgrade the CPU and memory. To rank service and support, we considered the length and breadth of each system's warranty and whether the manufacturer offers a variety of support services (for example, a private bulletin board, CompuServe access, and 24-hour phone support). In documentation, we looked primarily for thorough, indexed manuals; a quick-start guide; and a trouble-shooting hints book. Ease of installation includes how long it took us to get the system from boxes to bench, whether all of the components were included, and whether they all worked straight out of the box. Most were easily set up.

JOHN MONTGOMERY

## Technical Checkpoints: Pentium PCs

1. Peripherals Suited for Pentium Speed
2. A Well-Placed Fan and Adequate Ventilation
3. At Least a 400MB Hard Drive




**A.** Pentium power requires at least **16MB of RAM.**

**B.** A **local bus** ensures that your video keeps pace with your processor.

**C.** The Pentium chip's **heat sink** draws heat through its fins to dissipate it more efficiently.

**Ready Rocket:** A speedy desktop needs its components to keep up. Look for hard drives with plenty of cache, modems with large buffers, and tape drives with transfer rates fast enough to back up those megabytes overnight.

## DECISION MAKER

HOW TO BUY THE BEST **PENTIUM PC** FOR YOUR BUSINESS

| 1 Choose the factor most important to you. | 2 Choose the next most important factor. | 3 What else is important? | 4 For your needs, the best product to buy is . . . |
|---|---|---|---|
| Price | Overall Performance | Mechanical Design | Tri-Star Tri-CAD P-5 PCI |
| | | Service & Support | AST Premmia LX |
| | Service & Support | Mechanical Design | AST Premmia LX |
| | | Overall Performance | Tri-Star Tri-CAD P-5 PCI |
| Overall Performance | Price | Ease of Installation | Dell Dimension XPS P90 |
| | | Service & Support | Dell Dimension XPS P90 |
| | Mechanical Design | Service & Support | Dell Dimension XPS P90 |
| | | Ease of Installation | Dell Dimension XPS P90 |
| Service & Support | Price | Mechanical Design | AST Premmia LX |
| | | Overall Performance | ALR Evolution V ST/60 |
| | Overall Performance | Mechanical Design | ALR Evolution V ST/60 |
| | | Price | AST Premmia LX |

PC Best

**Pentium PC**

# Dell Dimension XPS P90

**PRICE:** The Dimension XPS P90 is reasonable at $4,499, although slightly slower machines go for around $3,500.

**WINDOWS PERFORMANCE:** It's out of the league of most of the other systems—a powerhouse. Our Winstone suite of Windows applications sailed.

**CPU PERFORMANCE:** It was 50 percent faster than the slowest system we tested, thanks to its maxed-out 90MHz processor.

**DISK PERFORMANCE:** A faster disk drive is the only component needed for this system to set speed records. Other performance scores were stellar.

**MECHANICAL DESIGN:** Its highly expandable, rough-and-tumble enclosure was easy to set up.

**Dimension XPS P90** / Dell Computer / (800) 289-3355 / (512) 338-4400 / $4,499
*Circle No. 673 on Reader Service Card*

PHOTOGRAPH BY MARK JOHANN

# Best 200 Systems

## Pentium PCs

| Rank | Product | Pros & Cons | Price 25%* | Windows Performance 15% | CPU/Memory Performance 10% | Disk Performance 10% | Video Performance 10% | Mechanical Design 10% | Service & Support 10% | Documentation 5% | Ease of Installation 5% | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PC Best 1 | **Dimension XPS P90**<br>Dell Computer<br>(800) 289-3355<br>$4,499<br>*Reader Service No. 673* | **Pros:** High performance scores thanks to a rocket-fast P-90 processor.<br>**Cons:** A bit too pricey, although the cost reflects that this is a souped-up, new 90MHz system. | 8.2 | 10 | 10 | 7.8 | 10 | 9.7 | 9.7 | 10 | 10 | **92.7** |
| 2 | **Poly 586PT**<br>Polywell Computers<br>(800) 999-1278<br>$4,185<br>*Reader Service No. 674* | **Pros:** A top-notch Windows performer, compact tower.<br>**Cons:** Video performance wasn't great, though disk performance was impressive. | 8.7 | 9.0 | 8.2 | 10 | 7.7 | 9.5 | 9.7 | 10 | 9.6 | **90.2** |
| 3 | **Blackship BLK P-60**<br>Blackship Computer<br>(800) 531-7447<br>$3,395<br>*Reader Service No. 675* | **Pros:** Excellent price (though it's a 60MHz system, not a P-90).<br>**Cons:** Performance lags. Bulky enclosure, though the rest of the design isn't bad. | 9.9 | 7.9 | 7.2 | 9.4 | 7.3 | 9.6 | 9.6 | 10 | 10 | **89.7** |
| 4 | **P90PCI PowerStation**<br>Micron Computer<br>(800) 438-3343<br>$4,199<br>*Reader Service No. 676* | **Pros:** Less expensive than Dell's Dimension XPS P90, yet it's also a P-90 machine.<br>**Cons:** Not quite as fast as the Dimension in several tests. | 8.6 | 9.1 | 10 | 7.3 | 8.2 | 9.5 | 9.6 | 9.7 | 10 | **89.6** |
| 5 | **Pantera**<br>Zeos Int'l<br>(800) 845-2353<br>$3,495<br>*Reader Service No. 677* | **Pros:** Good price, well-done documentation and super-easy install routine mean no headaches.<br>**Cons:** Large tower is fairly well designed. | 9.8 | 8.4 | 8.2 | 7.2 | 7.7 | 9.5 | 9.7 | 10 | 10 | **89.4** |
| 6 | **Premier P5-60**<br>Austin Direct<br>(800) 752-1577<br>$3,646<br>*Reader Service No. 678* | **Pros:** Lots of expansion, installation was easy as it gets.<br>**Cons:** Bulky enclosure, mediocre performance on CPU and disk tests. | 9.6 | 8.3 | 7.3 | 7.2 | 9.0 | 9.6 | 9.7 | 9.7 | 10 | **89.1** |
| 7 | **Ace Cache 586-66PCI**<br>Avik Computer<br>(800) 234-2945<br>$3,998<br>*Reader Service No. 679* | **Pros:** Easy to upgrade SIMMs, installation routine is very easy.<br>**Cons:** Less-than-stellar video performance, bulky enclosure, no ZIF socket. | 8.9 | 8.6 | 7.8 | 9.3 | 7.4 | 9.4 | 9.6 | 9.9 | 10 | **88.6** |

*PERCENTAGES REFLECT THE WEIGHT OF EACH FACTOR IN TOTAL SCORE. FACTORS ARE SCORED ON A SCALE OF 1 TO 10. TOTAL SCORES ARE NORMALIZED TO A SCALE OF 1 TO 100. NOTEWORTHY SCORES ARE HIGHLIGHTED IN RED.

*(table continues on page 124)*

### Usability Close-Up
### Unclip It and You're In

Tired of reaching for the Phillips screwdriver when you need to install a board? Then don't! **IBM's PS/ValuePoint P/60D** may not have been our top-scoring system, but its innovative enclosure did win a place in our hearts. One clever clip holds the entire cover on this system. Go ahead: Press the clip down. The cover slides off as though it were on ball bearings. Somebody obviously thought this through carefully. It may not seem like much if you never open your system, but if you've ever installed a sound card or new disk drive, you know that fumbling with screws and oddly shaped catches is the last thing you want to spend your time doing. It's so easy to get under the hood, you'll want to tinker.

**No Fumbling** The cover of IBM's PS/ValuePoint P/60D cover pops off almost automatically—just like that.

PHOTOGRAPH BY ARNOLD TIDSLJD

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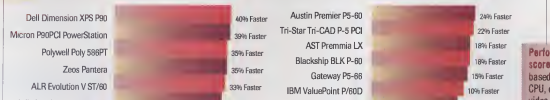
**Circle 184 on reader service card.**

| Rank | Product | Pros & Cons | Price 25%* | Windows Performance 15% | CPU/Memory Performance 10% | Disk Performance 10% | Video Performance 10% | Mechanical Design 10% | Service & Support 10% | Documentation 5% | Ease of Installation 5% | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | **Gateway P5-66**<br>Gateway 2000<br>(800) 846-2063<br>$3,795<br>*Reader Service No. 680* | **Pros:** Lots of room for expansion.<br>**Cons:** Large enclosure, performance not great, although the CPU performance was better than other speed tests. | 9.4 | 7.4 | 8.1 | 7.3 | 7.9 | 9.7 | 9.6 | 10 | 10 | **87.2** |
| 9 | **Tri-CAD P-5 PCI Station**<br>Tri-Star Computer<br>(800) 800-7668<br>$3,795<br>*Reader Service No. 681* | **Pros:** Documentation was lucid and installation was easy.<br>**Cons:** Performance was weak in CPU, disk, and video speed tests. | 9.4 | 8.2 | 7.3 | 7.2 | 7.4 | 9.6 | 9.7 | 10 | 9.8 | **86.9** |
| 10 | **Evolution V ST/60**<br>Advanced Logic Research<br>(800) 444-4257<br>$4,968<br>*Reader Service No. 682* | **Pros:** Performance is decent, although CPU speed could be faster.<br>**Cons:** Expensive. Drive bay cover could snap off more easily, although the design is otherwise strong. | 7.5 | 8.8 | 7.5 | 9.6 | 7.4 | 9.6 | 10 | 10 | 9.8 | **86.0** |
| 11 | **Insight PCI P60**<br>Insight Direct<br>(800) 755-3875<br>$3,549<br>*Reader Service No. 683* | **Pros:** Super price and very easy to install.<br>**Cons:** Performance times in Windows, CPU, disk, and video tests were inferior to most other scores. | 9.7 | 7.0 | 7.3 | 7.2 | 7.2 | 9.6 | 9.6 | 10 | 10 | **85.7** |
| 12 | **DP60/PCI**<br>Ambra Computer<br>(800) 252-6272<br>$3,700<br>*Reader Service No. 684* | **Pros:** Excellent enclosure, decent pricing.<br>**Cons:** The performance isn't there: Windows, CPU, and disk times were low. | 9.5 | 7.2 | 7.3 | 7.1 | 7.0 | 9.5 | 9.7 | 10 | 10 | **85.2** |
| 13 | **ValuePoint P/60D**<br>IBM<br>(800) 426-2968<br>$4,199<br>*Reader Service No. 685* | **Pros:** Great enclosure design, easy installation, plus very lucid documentation.<br>**Cons:** Low performance on Windows, CPU, disk, and video speed tests. | 8.6 | 7.3 | 7.3 | 7.2 | 7.3 | 9.9 | 9.7 | 10 | 10 | **83.9** |
| 14 | **Premmia LX**<br>AST Research<br>(800) 876-4278<br>$4,538<br>*Reader Service No. 686* | **Pros:** Outstanding and very accessible support.<br>**Cons:** Low overall performance—it was among the slowest in our Winstone applications suite. | 8.0 | 7.5 | 7.3 | 7.2 | 7.7 | 9.6 | 10 | 10 | 9.8 | **83.0** |

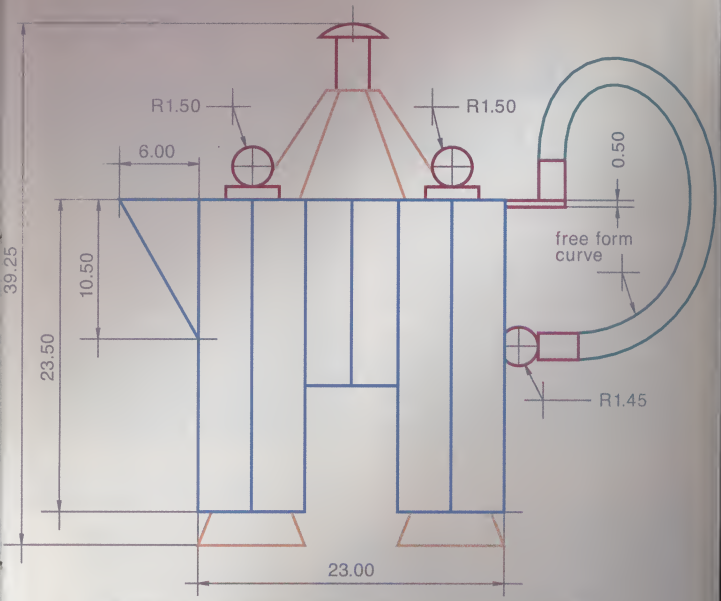
*PERCENTAGES REFLECT THE WEIGHT OF EACH FACTOR IN TOTAL SCORE. FACTORS ARE SCORED ON A SCALE OF 1 TO 10. TOTAL SCORES ARE NORMALIZED TO A SCALE OF 1 TO 100.

## Performance Spotlight: Pentium PC Windows Application Tests




**Performance scores** (above) are based on Windows, CPU, disk, and video tests.

NOTE: WINDOWS TESTS MEASURE APPLICATIONS, GRAPHICS, AND DISK PERFORMANCE.

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# Double-Barreled Servers Are Loaded Network Guns

Forget what you know about file servers. A new generation of distributed client-server applications demand a lot more from a server than a 486 can provide—more processing power, better I/O subsystems, more robust fault-tolerant setups, and, most of all, ease of maintenance. So this year, *PC Computing* decided to focus on the cutting edge of performance: the Pentium system. These are the ultimate systems for state-of-the-art network performance, and our top scorers posted closely matched results.

To qualify for our tests, each file server had to come equipped with a Pentium processor, a minimum of 32MB of RAM, and an external cache of 256K or higher. And, as befits a system that's going to act as storage central for an entire network, the server also needed a minimum of 1GB of hard-disk space and at least two free drive bays. We awarded extra points to machines that came with a drive array, because they not only boost fault tolerance but also make for better disk performance in speed tests.

**Market Trends: Pentium Servers**

1. Components Keeping Servers Pricey
2. Potential Price Jumps from New Chips
3. Desktop PC Prices Declining More Rapidly

**Driven by Demand:** Server prices have held steady, unlike desktop PCs, which have dropped in price as sales have increased. Why? Dramatically increasing demand, high manufacturing costs, and a flood of new chips.

After the dust cleared, only six systems survived our rigorous battery of network tests. They're all solid network quarterbacks with different strengths.

**Factors and Weights** A network is only as fast as its slowest bottleneck, so in rating each system, we counted its network performance results as 35 percent of its total score. The final network performance score is extrapolated from a series of tests that stressed both the server's disk performance and network throughput. In every way we tested, we strove to exercise *total* system performance—crucial for servers.

When dozens of users depend on one machine for file and print services, cost becomes less of a sticking point. As a result, we counted price as 15 percent of the score—important, but secondary to the overall performance of the system. However, because the file server is the most important link of any network, we weighted each vendor's service and support equally with price. Because we anticipated that these machines will also be used as application servers, we counted CPU performance as 10 percent of the total score. We considered the server's mechanical design—including the number of slots, case design, and security features—as 10 percent of the final score. Most of the designs left room for unprecedented expandability options. Finally, also important are factors that make installing and maintaining the server as easy as possible: documentation counts for 10 percent of the final score, and ease of installation is weighted at 5 percent.

**How We Tested** ZD Labs tested the servers on an Ethernet network running Novell NetWare 3.12. The network configuration consisted of 16 workstations divided into four-station segments; each segment was connected to one of four adapters in the server. Each test was run with 4, 8, 12, and 16 nodes attached, with extra points awarded to systems that performed well with a higher number of nodes.

The CPU utilization test measured the processing power of each system as well as the effectiveness of its memory cache. The network performance test measured both the maximum amount of network traffic the server could handle, and how well the server's disk subsystem performed—obviously, systems that came equipped with redundant array of inexpensive disks (RAID) drives did better in this portion of the tests. Finally, we considered the physical design and network operating-system configuration in our scoring. SHYAMALA REDDY

## DECISION MAKER

HOW TO BUY THE BEST **PENTIUM SERVER** FOR YOUR BUSINESS

| 1 Choose the factor most important to you. | 2 Choose the next most important factor. | 3 What else is important? | 4 For your needs, the best product to buy is . . . |
|---|---|---|---|
| Network Performance | CPU Performance | Mechanical Design | IBM PS/2 Server 95 560 |
| | | Documentation | Dell PowerEdge SP 566 |
| | Mechanical Design | Service & Support | HP NetServer 5/66 LM |
| | | CPU Performance | IBM PS/2 Server 95 560 |
| Price | Network Performance | CPU Performance | ALR Evolution VQ 66MHz |
| | | Service & Support | Compaq ProLiant 1000 |
| | CPU Performance | Service & Support | Compaq ProLiant 1000 |
| | | Mechanical Design | Acer Altos 7000 |
| Service & Support | Price | Network Performance | HP NetServer 5/66 LM |
| | | Ease of Installation | Compaq ProLiant 1000 |
| | Network Performance | CPU Performance | IBM PS/2 Server 95 560 |
| | | Documentation | HP NetServer 5/66 LM |

PC Best

**Pentium Server**

# HP NetServer 5/66 LM

**NETWORK PERFORMANCE:** Consistently finished in the top three, regardless of the number of nodes served or the size of files crunched.

**PRICE:** For $13,400, you get a 66MHz Pentium system with four network cards, a 256K cache, and 32MB of RAM installed.

**SERVICE AND SUPPORT:** Combine a great onsite service policy, 24-hour support, and a 3-year warranty, and you've truly hit the jackpot.

**DOCUMENTATION:** With the network operating system already configured, it was a snap to set up.

**MECHANICAL DESIGN:** The only missing must-have was a built-in RAID subsystem, which some others include.

**NetServer 5/66 LM** / Hewlett-Packard / (800) 637-7740 / $13,400
*Circle No. 687 on Reader Service Card*

PHOTOGRAPH BY MARK JOHANN

# Best 200 Systems

## Pentium Servers

| Rank | Product | Pros & Cons | Network Performance 35%* | Price 15% | Service & Support 15% | Documentation 10% | Mechanical Design 10% | CPU Performance 10% | Ease of Installation 5% | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|
| Best 1 | **NetServer 5/66 LM**<br>Hewlett-Packard<br>(800) 637-7740<br>$13,400<br>*Reader Service No. 687* | **Pros:** Excellent for disk-intensive applications and workgroups with fewer than 16 users. The clear winner in speed tests.<br>**Cons:** Fairly high price, no built-in RAID system was the only notable flaw. | 9.4 | 9.1 | 9.8 | 9.5 | 9.4 | 8.9 | 10 | 94.1 |
| 2 | **PS/2 Server 95 560**<br>IBM<br>(800) 772-2227<br>$13,715<br>*Reader Service No. 688* | **Pros:** Among the best-supported servers. Top performer in workgroups of four users or fewer.<br>**Cons:** The price could come down. Who wants to spend nearly 14 grand on four users? | 9.0 | 9.1 | 9.8 | 9.5 | 9.6 | 9.6 | 10 | 93.6 |
| 3 | **ProLiant 1000 5/60**<br>Compaq<br>(800) 343-1518<br>$10,456<br>*Reader Service No. 689* | **Pros:** Recommended for departments of 12 or fewer users, good price/performance, RAID support. Great support policies and accessibility—key for servers.<br>**Cons:** No local-bus slots. | 8.7 | 9.7 | 10 | 9.5 | 9.3 | 9.1 | 10 | 92.9 |
| 4 | **PowerEdge SP 566**<br>Dell Computer<br>(800) 289-3355<br>$15,908<br>*Reader Service No. 690* | **Pros:** Best choice for disk-intensive apps in larger workgroups, RAID support. Documentation and installation leave no holes.<br>**Cons:** This is the most expensive server we tested. | 9.3 | 8.8 | 9.1 | 10 | 9.2 | 9.1 | 10 | 92.7 |
| 5 | **Evolution VQ 66MHz**<br>Advanced Logic Research<br>(800) 444-4257<br>$12,124<br>*Reader Service No. 691* | **Pros:** RAID support, solid performer, middle-of-the-pack local-bus graphics.<br>**Cons:** Only six slots, mediocre documentation left us with some questions. | 8.9 | 9.3 | 9.3 | 8.5 | 9.1 | 9.1 | 10 | 90.8 |
| 6 | **Altos 7000**<br>Acer America<br>(800) 368-2237<br>$9,417<br>*Reader Service No. 692* | **Pros:** Killer price: An under-$10,000 price tag is rare for this class of server. We're impressed.<br>**Cons:** One hard drive, no RAID support, worst network performer in our speed tests. | 8.2 | 10 | 9.3 | 8.5 | 9.3 | 10 | 9.0 | 90.0 |

*PERCENTAGES REFLECT THE WEIGHT OF EACH FACTOR IN TOTAL SCORE. FACTORS ARE SCORED ON A SCALE OF 1 TO 10. TOTAL SCORES ARE NORMALIZED TO A SCALE OF 1 TO 100. NOTEWORTHY SCORES ARE HIGHLIGHTED IN RED.

## Usability Close-Up
### Simplicity and Safety First

Don't buy **Compaq's ProLiant 1000 5/60** just because you need the speed. For starters, you can open the case without any trouble—no tiny screws to hassle with. And it has a unique safety feature: It won't run if the case is open.

**Safety First** Crack the ProLiant 1000 5/60's case and it won't run.

## Performance Spotlight: Network Tests

Network performance scores (above) are based on several systemwide tests.

PHOTOGRAPH BY ARNOLD TIOSE JO

# WHAT LOOKS LIKE A TRINITRON® MONITOR, BUT IS BIGGER AND BETTER?

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Best of all, you can get all the benefits of advanced DiamondTron technology in our Diamond Pro 21T monitor for just $2,525 MSRP.

For more information about DiamondTron and the Diamond Pro 21T monitor, call us at 1-800-843-2515. In Canada call 1-800-387-9630. *For immediate product specifications, call Mitsubishi Quikfax at 1-800-937-2094.*

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DISPLAY PRODUCTS

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**Circle 120 on reader service card.**

# Top-Tier Totables: You Can Have It All

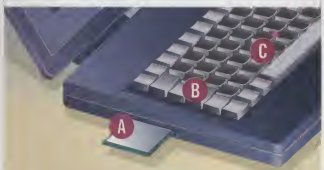
Which is growing faster, the transistor count on Intel's processors or our appetite for smaller, lighter, faster, better, and more colorful machines? Who cares? We're getting it all anyway—faster processors, longer battery life, and more colorful, truly dazzling screens—all at a pace that's very hard to follow.

Last year, *PC Computing*'s Best 200 discussed the merits of buying a budget 386 or monochrome notebook instead of the power and color of "high-end" models. But prices and technology have changed so much in the past year that there's just no reason to consider giving up 486 power or color—not for a good price, not even for longer battery life. Today—unlike last year—you can have it all.

We assembled an extensive collection of 33MHz to 75MHz 486 color notebooks with the features most likely to top your portable wish list. Then we tested them in every way possible to find only the best. In fact, this year's crop of full-sized notebooks is so good that last year's winner wouldn't even have made the cut!

## Technical Checkpoints: Color Notebooks

1. Weight Not to Exceed Seven Pounds
2. Minimum Two-Hour Battery Charge
3. At Least a 9.5-inch Screen




**A.** Get at least one **PCMCIA slot** for modems, extra storage, and network connections.

**B.** The **keyboard** should be no more than 15 percent smaller than a desktop keyboard.

**C.** Insist on a **built-in pointing device** for mouseless convenience when you're on the road.

**Worth the Weight:** A notebook should not exceed seven pounds, and peripherals shouldn't add more than two pounds. Adapters will add about a pound, and you should always carry extra batteries—especially with color.

We recognize that no single machine could possibly satisfy everyone's needs. You may put special emphasis on weight, battery life, display quality, or some other factor, so our Decision Maker on page 133 highlights the strengths of individual portables. Use the Decision Maker to narrow the field to match your own preferences and needs.

**Factors and Weights** Performance, price, battery life, and display and ergonomics each account for 15 percent of a notebook's total score. Scores for performance reflect component-specific results measured by ZD Labs' Winbench and PCbench, and application throughput measured by ZD Labs' Winstone. Displays are scored on the basis of their size, brightness, contrast, and overall quality. Ergonomics includes the layout and response of the keyboard, whether you can "hot swap" batteries without powering down the system, whether a software-based or LCD battery gauge is included, the quality and functionality of the pointing device, and other usability-oriented design details.

Durability, portability, and documentation and installation each make up 10 percent of the total score. *PC Computing* Labs evaluated each notebook's durability by taking into account design elements such as the quality of the hinge, port covers, and door latches. Half of the portability score is based on the machine's size and weight with a battery. To this we add a score for each machine's complete traveling weight—with cables, AC adapter, and other necessary add-ons—and derive a combined score.

Ports and expansion, and service and support ratings each contribute 5 percent to the total score. For the ports-and-expansion factor, high points go to flash BIOS, PCMCIA slots, removable hard drives, upgradable CPUs, and available docking stations.

**How We Tested** *PC Computing* Labs weighed and measured each notebook, its battery, and its recharger. We depleted the batteries, then recharged them, repeating the process three times. We then ran the Rundown component of PCbench, which keeps the processor at full power and the backlight turned on, and regularly accesses the hard disk.

We evaluated performance using ZD Labs' benchmarks. We reviewed each company's service and support policies as well as the product documentation. Finally, we used a jury to rate ergonomics, ease of installation, and display quality. Our top finishers scored very closely.

MIKE HOGAN

# WinBook *XP*

**HIGHEST QUALITY, BEST FEATURES, LOWEST PRICE!**

SUPER-FAST INTEL DX4-75MHz WITH LOCAL BUS VIDEO ACCELERATED GRAPHICS, UP TO 32MB RAM AND HARD DRIVE CAPACITY TO 520MB

LONGER BATTERY LIFE WITH TEN-CELL 2500mA NiMH BATTERIES

UPGRADABLE SCREEN AND USER-EXPANDABLE RAM, REMOVABLE HARD DRIVE AND PCMCIA CAPABILITIES

SUPERB ERGONOMICS AND KEYBOARD WITH FULL SIZE KEYS, SLOPING WRIST REST PLUS A CHOICE OF POINTING DEVICES

# Take a permanent vacation from your desktop with the 75MHz WinBook *XP*

Set yourself free from your desktop and move up to new heights in performance and value with the 75MHz WinBook® XP. Never before has the concept of "desktop replacement" been so closely matched in power, comfort and price. The 32-bit local bus video Rocketchip accelerator boosts your graphics performance level along with a ten-cell NiMH 2500mA battery pack that will keep you running. You get the same unique ergonomic features that critics raved about with the original WinBook—full size keys, a sloping wrist rest, and now your choice between the TrackPoint II-like pointing device or an optional 19mm dual-button trackball. Plus an LCD indicator lets you to monitor functions at a glance.

To give the WinBook XP a big future, you can upgrade components as you need to with user-upgradable RAM to 32MB, upgradable screen (to a larger dual-scan color or active matrix), removable hard drives to 520MB capacity and PCMCIA capabilities. Options include a 14.4 fax/voice/data modem, internal audio and docking station.

Along with your WinBook XP, you get excellent support and a 30-day money-back guarantee. You also get quick service turn-around, a one-year limited warranty on parts and labor plus toll-free technical support for the life of your computer. Your purchase is backed by our 15 years of computer experience and over 2.2 million satisfied customers.

Say "Bon voyage" to your desktop and order the WinBook XP today.

## WinBook XP features

- SL ENHANCED INTEL 486 DX4-75MHz
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- DIMENSIONS 11.3" X 8.5" X 1.7"
- 4 OR 8MB RAM (EXPANDS TO 16 OR 32MB)
- 3.5" 1.44MB DISKETTE DRIVE
- REMOVABLE 120 TO 520MB HARD DRIVE
- 10.4" OR 9.5" VGA DUAL SCAN STN COLOR OR OPTIONAL 9.5" ACTIVE MATRIX DISPLAY
- 10-CELL 2500mA NiMH BATTERY & AC PACK
- SUSPEND/RESUME FEATURE
- TWO TYPE II OR ONE TYPE III PCMCIA SLOT
- INTEGRATED TRACKPOINT II LIKE POINTING DEVICE OR OPTIONAL DUAL-BUTTON 19mm TRACKBALL
- PARALLEL, SERIAL & PS/2® PORTS
- 1MB MEMORY WITH EXTERNAL VGA PORT
- LCD FUNCTION INDICATOR PANEL
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- INTERNAL AUDIO OPTIONAL
- 4 SLOT DOCKING STATION OPTIONAL

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- 9.5" Dual Scan Color
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**Circle 188 on reader service card.**

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We're Mitsumi. We're one of the world's leading suppliers of PC peripherals. Keyboards, mice, floppy disc drives and CD-ROM drives! So we're used to being used.

Case in point: our new double-speed CD-ROM drive has the highest reliability rating in the industry. Buy one today and you can be assured that you'll get optimum performance and longevity. And each of our three keyboard models is guaranteed to withstand more than 10 million keystrokes. So you can pound out literally millions of documents without missing a beat.

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Price is another Mitsumi advantage that millions of computer users have experienced. Because high volume production is our specialty, we're able to offer world-class peripherals at prices that help keep your bottom line—in line.

So share what millions of Mitsumi customers have already done.

**Drag Us. Punch Us. Drive Us. Call Us.**

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**The New Mitsumi Wireless Printer Sharing Kit.**

*For remote networking with no cards or cables. Connects up to sixteen PCs to any one of four individual printers. Easily attaches to parallel port.*

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## DECISION MAKER

HOW TO BUY THE BEST **COLOR NOTEBOOK** FOR YOUR BUSINESS

| 1 Choose the factor most important to you. | 2 Choose the next most important factor. | 3 What else is important? | 4 For your needs, the best product to buy is . . . |
|---|---|---|---|
| Performance | Price | Portability | Gateway ColorBook |
| | | Battery Life | Micro Express NB8266 |
| | Battery Life | Portability | TI TravelMate 4000E |
| | | Durability | IBM ThinkPad 750C |
| Price | Performance | Durability | Gateway ColorBook |
| | | Display | Zenith Z-Note+ Model 200 |
| | Battery Life | Ergonomics | Austin 486DX-33 |
| | | Portability | AST Bravo & Dell Latitude |
| Battery Life | Price | Portability | Gateway ColorBook |
| | | Display | Duracom TravelPro |
| | Performance | Service & Support | Toshiba T4800CT |
| | | Durability | IBM ThinkPad 750C |

PC Best

### Color Notebook

## IBM ThinkPad 750C

**PERFORMANCE:** Its 33MHz 486SL CPU with integrated math coprocessor puts zip into Windows apps. It wasn't quite as fast as TI's TravelMate 4000E, but it's fast enough for us.

**PRICE:** At $5,174, it could be cheaper, but its battery life and rugged case more than compensate.

**BATTERY LIFE:** At just more than three hours, its battery life was unsurpassed in our tests.

**PORTABILITY:** The TrackPoint II pointing device, port replicator, and docking station ease travel. It wasn't the lightest, but we were happy.

**DURABILITY:** Look no further. The ThinkPad 750C is built like a fortress and stood up to all of our tests.

**ThinkPad 750C** / IBM / (800) 772-2227 / $5,174
*Circle No. 694 on Reader Service Card*

PHOTOGRAPH BY MARK JOHNSON

# Best 200 Systems

## Color Notebooks

| Rank | Product | Pros & Cons | Performance 15%* | Price 15% | Battery Life 15% | Display & Ergonomics 15% | Portability 10% | Durability 10% | Documentation & Installation 10% | Ports & Expansion 5% | Service & Support 5% | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **ThinkPad 750C**<br>IBM<br>(800) 772-2227<br>$5,174<br>*Reader Service No. 694* | **Pros:** Not only the longest running, but pretty fast and well rounded. Battery life was outstanding in our tests. Very rugged case.<br>**Cons:** Not the cheapest. | 8.2 | 7.6 | 10 | 9.2 | 8.8 | 10 | 8.4 | 9.7 | 8.9 | **89.0** |
| 2 | **ColorBook**<br>Gateway 2000<br>(800) 846-2000<br>$2,995<br>*Reader Service No. 695* | **Pros:** Lightest in its class, good all-around performer, great price. As far as portability goes, this is one outstanding notebook. Documentation was also impressive.<br>**Cons:** Fair display. | 8.2 | 9.3 | 9.1 | 8.1 | 10 | 8.8 | 9.5 | 8.8 | 8.2 | **88.9** |
| 3 | **Toshiba T4800CT**<br>Toshiba America<br>(800) 334-3445<br>$6,499<br>*Reader Service No. 696* | **Pros:** Great performance, battery life, display, and ergonomics. In Windows tests, the T4800CT was an all-star performer.<br>**Cons:** Expensive. | 9.6 | 6.6 | 9.4 | 9.1 | 7.7 | 9.2 | 9.4 | 10 | 9.5 | **88.1** |
| 4 | **Bravo NB 4/33s Color****<br>AST Research<br>(800) 876-4278<br>$2,541<br>*Reader Service No. 697* | **Pros:** Priced to please, well supported, lightweight and totable.<br>**Cons:** Battery life and performance not up to par with the rest of the system. You'll wish for another hour. | 7.3 | 9.8 | 8.1 | 8.2 | 9.1 | 8.9 | 8.9 | 8.5 | 9.0 | **85.8** |
| 5 | **TravelPro 486/66DX2** Active Color**<br>Duracom Computer<br>(800) 551-9000<br>$4,289<br>*Reader Service No. 699* | **Pros:** A pretty good performer, great battery life. Jury testers were impressed with the display. Expandability options are top-notch.<br>**Cons:** A little heavy and expensive. | 8.5 | 8.3 | 9.6 | 8.6 | 7.1 | 8.5 | 8.7 | 9.7 | 8.3 | **85.8** |
| 6 | **LTE Lite 4/33C****<br>Compaq Computer Corp.<br>(800) 345-1518<br>$4,899<br>*Reader Service No. 698* | **Pros:** Light yet highly durable, good display. Support policies and availability knocked us out.<br>**Cons:** A little slower and more expensive than expected. | 7.7 | 7.8 | 8.3 | 8.7 | 8.7 | 9.8 | 10 | 7.0 | 10 | **85.8** |

*PERCENTAGES REFLECT THE WEIGHT OF EACH FACTOR IN TOTAL SCORE. FACTORS ARE SCORED ON A SCALE OF 1 TO 10. TOTAL SCORES ARE NORMALIZED TO A SCALE OF 1 TO 100. NOTEWORTHY SCORES ARE HIGHLIGHTED IN RED. **IN THE EVENT OF A TIE IN TOTAL SCORES, THE MORE AFFORDABLE PRODUCT IS RANKED HIGHER.

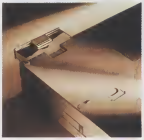
*(table continued on page 139)*

### Usability Close-Up
### Carry a Spare

You can't get multiple hard drives in a portable? Who says? An increasing number of portables such as **Gateway 2000's ColorBook** offer the ability to switch hard drives without rebooting. That means you can carry a "big" 200MB drive dedicated strictly to a jumbo parts or customer database, another drive with an oversized multimedia presentation, and a third with an array of less-taxing applications and files. The possibilities are limitless.

These rugged, easily removable 2.5-inch drives are barely larger than your shirt pocket and will tuck away easily and securely in a corner of your briefcase.

Who says you can't have it all?



**A Switcheroo** Gateway doesn't stick you with just one hard drive. You can mix and match removable drives.

PHOTOGRAPH BY ARNOLD TIDSELJO

If price were
no object,
you'd probably
go for a
Digital PC.

## DECpc LPv+ 425sx

- *Intel486™ SX/25MHz*
- *4MB RAM*
- *170MB IDE hard drive*
- *14" SVGA 1024i color monitor*
- *S3™ 805 graphics accelerator*

$1,348 *$47/mo. lease*

You could look it up. According to a recent survey,* people are willing to pay extra for Digital PCs. They're that good.

We're flattered. But the truth is, you don't have to lay out big bucks to get Digital quality. Quite the contrary.

# So go.

You can now get three of the best desktops that money can buy. *For a lot less than anyone might expect.*

These machines—including two new green models—start at just $1,348. And you can even get a PC with a *true Pentium™ processor* for just $2,798. And that's with monitor.

The DECpc LPv+ 425sx saves you money even in its sleep. We re-engineered what *PC Week*[1] magazine called "one of the 12 best products of 1993" to do a lot more…and use a lot less juice, to boot.

All DECpc LPv+ models come with such power features as a GUI accelerator, 170 to 525MB hard drive and a LIF socket for quick chip upgrades.

Yet they use less than 30 watts in sleep mode—well below EPA Energy Star standards, not to mention how much they can save you on electric bills.

## DECpc LPx+ 433sx

- *Intel486™ SX/33MHz*
- *4MB RAM*
- *170MB IDE hard drive*
- *14" SVGA 1024i color monitor*
- *S3 805 graphics adapter*
- *6 slots (2 VESA-VL, 4 ISA)*

Call for price

The DECpc LPx† 433sx is a green monster —a value-priced energy saver that won't constantly remind you of it.

DIGITAL 3 YEAR WARRANTY

This machine zips along at a nice 33MHz clip, and comes with two VESA-VL local bus slots as well as four ISA slots.

So it delivers Windows™ workstation speed, power and expandability—and user-friendly utility bills, too.

The DECpc LPx 560 Here's a true 60MHz Pentium processor desktop at the price of an Intel486™ processor PC. Just $2,798.

Plus, it includes three ISA, two PCI and one interleaved slot for plenty of expansion options. Sure, you could pay more for all this Pentium technology —but why would you want to?

So how can we offer made-by-Digital quality at made-by-who prices? Not by cutting corners, certainly. All three models are engineered by the same folks who build our high-end PCs: Us.

Which is why we back them with the same comprehensive warranty‡ we offer on all our PCs.

So what are you waiting for? Call the number below for any Digital PC you want on this or the next page.

You've always wanted to say, "Money is no object." Now you can. Without paying the price.

intel inside pentium PROCESSOR

## DECpc LPx 560

- *Pentium™ 60MHz processor*
- *256KB cache*
- *8MB RAM*
- *540MB IDE hard drive*
- *14" SVGA 1024x color monitor*
- *PCI local bus*
- *6 slots (3 ISA, 2 PCI, 1 interleaved)*
- *S3 928 video adapter*

$2,798 *$97/mo. lease*

## DECpc LPx 566

- *Pentium™ 66MHz processor*

$3,098 *$108/mo. lease*

To order, or for the name of the Digital reseller near you, call

**1 800 581-7911**

8:30 a.m. to 8:00 p.m. ET, Mon.–Fri. Please reference BZX when you call.

digital™ PC

Beyond the box.

**The Wall Street Journal*, October 15, 1993—McKinsey & Co. and Intelliquest Inc.
†December 27, 1993.
‡Three-year limited hardware warranty. Certain restrictions and exclusions apply. Warranty service on PC notebooks is return-to-factory. Monitors, batteries and peripherals covered by a one-year warranty.

# Name your specs. We've got a PC to fit them.

## NOTEBOOKS
Modular notebooks that let you upgrade processors, disk drives, and more

NEW!

| | |
|---|---|
| 25MHz i486™ SE (mono) | $1,549 |
| 25MHz i486 SE (color) | $2,299 |

Lease for as low as $54/month

| | |
|---|---|
| 33MHz i486 SLC Premium (color) | $4,199 |

Lease for as low as $146/month

4MB RAM (expandable to 20MB)
120MB hard drive
1 PCMCIA Type I, II or III slot

4MB RAM (expandable to 32MB)
200MB removable hard drive
1 PCMCIA Type III slot, or 2 Type I or Type II slots

3.5" floppy drive
8KB cache
MS-DOS® and Windows for Workgroups™ 3.11
Embedded numeric keypad
NiMH battery
Advanced power management
AC adapter
3 Year Warranty

## LPv+ SYSTEMS
Energy Star compliant systems

NEW!

| | |
|---|---|
| 25MHz i486 SX | $1,348 |
| 33MHz i486 SX | $1,448 |
| 33MHz i486 DX | $1,698 |
| 50MHz i486 DX2 | $1,798 |
| 66MHz i486 DX2 | $2,098 |

Lease for as low as $47/month

Local bus SVGA video
GUI accelerator
4MB RAM (expandable to 64MB)
S3™ 805 1MB graphics accelerator
170MB hard drive
3 ISA slots
4 drive bays

OverDrive™ processor upgrade
3.5" floppy drive
14" SVGA(i) color monitor
MS-DOS and Windows for Workgroups 3.11
Mouse
101-key keyboard
Energy Star compliant
3 Year Warranty

## LPx SYSTEMS
Value-priced performance and expandability



| | |
|---|---|
| 33MHz i486 SX | $1,597 |
| 33MHz i486 DX | $1,847 |
| 50MHz i486 DX2 | $1,947 |
| 66MHz i486 DX2 | $2,247 |

Lease for as low as $56/month

VESA-VL bus GUI accelerator
4MB RAM (expandable to 64MB)
S3 805 1MB graphics adapter
170MB hard drive
6 slots (2 VESA-VL, 4 ISA)
5 drive bays
3.5" floppy drive

Pentium™ OverDrive™ processor upgrade
14" SVGA(i) color monitor
MS-DOS and Windows for Workgroups 3.11
Mouse
101-key keyboard
3 Year Warranty

NEW!

| | |
|---|---|
| 60MHz Pentium™ chip | $2,798 |
| 66MHz Pentium™ chip | $3,098 |

Call for complete specs.
Lease for as low as $97/month

## XL SYSTEMS
Pentium processor upgradable, with PCI local bus

| | |
|---|---|
| 33MHz i486 DX | $2,549 |
| 66MHz i486 DX2 | $2,649 |
| 60MHz Pentium chip | $3,199 |
| 66MHz Pentium chip | $3,449 |

Lease for as low as $88/month

8MB RAM (expandable to 192MB onboard)
340MB SCSI hard drive
3.5" 1.44MB floppy drive
S3 928 PCI graphics accelerator
1MB video RAM (expandable to 2MB)
Double-speed SCSI CD-ROM*
15" SVGA, LE, NI color monitor*
*Optional. Not included in price.

6 slots (2 PCI, 3 ISA, 1 ISA/PCI interleaved)
128/256KB cache
5 drive bays
Onboard PCI SCSI-II
MS-DOS and Windows for Workgroups 3.11
Upgradable to Pentium OverDrive and full Pentium processors
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intel inside

digital™ PC
Beyond the box.

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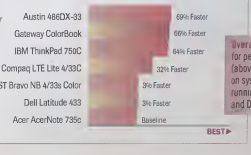
Call for best prices

## Color Notebooks *(continued)*

| Rank | Product | Pros & Cons | Performance 15%* | Price 15% | Battery Life 15% | Display & Ergonomics 15% | Portability 10% | Durability 10% | Documentation & Installation 10% | Ports & Expansion 5% | Service & Support 5% | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | **TravelMate 4000E WinDX4/75 Active Color**<br>Texas Instruments<br>(800) 848-3927<br>$5,449<br>*Reader Service No. 700* | **Pros:** A 75MHz DX4 made this our top performer, exceptional keyboard. Expansion options rated highly. **Cons:** Neither cheap nor particularly long running—yet. | 10 | 7.3 | 7.4 | 8.5 | 8.7 | 8.4 | 9.5 | 9.7 | 8.0 | 85.3 |
| 8 | **AcerNote 735c**<br>Acer America<br>(800) 368-2237<br>$2,464<br>*Reader Service No. 701* | **Pros:** Low price for this class of product, light weight for its category. **Cons:** Slow in most of our performance tests. Least battery life next to Texas Instruments' TravelMate. | 7.3 | 10 | 8.0 | 8.4 | 8.5 | 8.4 | 8.7 | 8.8 | 9.2 | 85.2 |
| 9 | **Z-Note+ Model 200**<br>Zenith Data Systems<br>(800) 553-0331<br>$3,599<br>*Reader Service No. 702* | **Pros:** Good keyboard, display, and price; fairly good performance in Windows tests. **Cons:** Inconvenient mouse, not very portable due to relatively heavy weight. | 8.3 | 8.9 | 8.7 | 9.1 | 7.4 | 8.0 | 8.9 | 7.0 | 8.5 | 84.6 |
| 10 | **Latitude 433**<br>Dell Computer<br>(800) 289-3355<br>$2,698<br>*Reader Service No. 703* | **Pros:** AST Bravo in disguise, with same portability but better documentation. A durable case. **Cons:** A mediocre performer in speed tests next to the others. | 7.3 | 9.6 | 8.1 | 8.2 | 7.8 | 8.7 | 9.5 | 8.5 | 8.7 | 84.4 |
| 11 | **Micro Express NB8266**<br>Micro Express<br>(800) 989-9900<br>$4,499<br>*Reader Service No. 704* | **Pros:** A 486DX2/66 with snappy performance, good display, good battery life. **Cons:** Heavier than most, documentation wasn't as complete and thorough as some others. | 9.1 | 8.2 | 8.8 | 8.7 | 7.0 | 8.5 | 7.5 | 9.7 | 8.2 | 84.2 |
| 12 | **Austin 486DX-33 Dual-Scan Color Notebook**<br>Austin Direct<br>(800) 752-1577<br>$2,899<br>*Reader Service No. 705* | **Pros:** Good blend of price, performance, and battery life. Consistent performer in most tests. **Cons:** Poor durability vs. others, service and support weren't up to par with most contenders. | 8.2 | 9.4 | 8.4 | 8.5 | 8.5 | 7.6 | 8.3 | 7.6 | 7.8 | 83.9 |

*PERCENTAGES REFLECT THE WEIGHT OF EACH FACTOR IN TOTAL SCORE. FACTORS ARE SCORED ON A SCALE OF 1 TO 10. TOTAL SCORES ARE NORMALIZED TO A SCALE OF 1 TO 100. NOTEWORTHY SCORES ARE HIGHLIGHTED IN RED.

### Performance Spotlight: Color Notebook Windows Application Tests




**Overall scores** for performance (above) are based on system speed running Windows and DOS tests.

# New Color for the Road: The Lightest and Brightest

Notwithstanding the progress in notebooks, the big news in portables this year is the emergence of subnotebooks as truly viable options for business travelers.

While a successful notebook involves as much art as science, the creation of a color subnotebook is high art and high science. At the very least, packing a desktop's worth of features and power into a subnotebook requires the art of compromise—making calculated but necessary trade-offs to achieve a well-rounded product overall. The process can be tricky.

Balancing battery weight with screen quality and performance is no easy task—note that our list of color subnotebooks is much shorter than those for monochrome versions or full-sized color notebooks.

Products in this class typically weigh between four and five pounds, have a smaller footprint, and are slimmer than full-sized notebooks. The smaller form factor often begets sacrifices in keyboard layout, screen size, and hard-drive capacity, but as you can see from our lineup, this is not always the case. You can expect to give up an onboard floppy drive. But all of the products we tested have at least an optional outboard floppy drive and access to docking stations for more functionality at home. They were also all 486s.

Because needs vary, we've detailed possible color subnotebook choices for you in our Decision Maker on page 143—it will lead you to the right product for your situation. We differentiate among competitors on the basis of performance, price, and battery life, as well as several ancillary factors.

**Factors and Weights** Performance, price, battery life, and display and ergonomics each account for 15 percent of a color subnotebook's total score. Performance scores were based on ZD Labs' Winbench and PCbench benchmark tests as well as application throughput measured by the Winstone test suite. In scoring displays, a jury considered size, brightness, contrast, and overall quality with different text and graphics screens displayed. Ergonomics includes the layout and response of the keyboard, whether you can hot swap batteries without powering down the system, whether a software-based or LCD battery gauge is included, and the quality and functionality of the pointing device.

Portability, durability, and documentation and installation each count for 10 percent of the total scores. Half of the portability score is based on the machine's size and weight with a battery. To that we add a score for complete traveling weight—with cables, AC adapter, and other necessary add-ons. To score durability, *PC Computing* Labs evaluated design elements such as hinges, port covers, and door latches.

Ports and expansion, and service and support contribute 5 percent each to the total scores. To score highly in our ports-and-expansion evaluation, products had to have flash BIOS, PCMCIA slots, removable hard drives, upgradable CPUs, and docking stations.

**How We Tested** *PC Computing* Labs weighed and measured each subnotebook, plus its battery and recharger. The batteries were depleted and recharged three times. We then ran the PCbench Rundown test, which keeps the processor at full power, the backlight turned on, and regularly accesses the hard disk.

*PC Computing* Labs evaluated each subnotebook's performance using ZD Labs' speed tests. We scored service and support policies using a rigorous checklist and scored documentation for thoroughness and presentation.

MIKE HOGAN

## Market Trends: Color Subnotebooks

1. Sales of Mono Portables Declining
2. Monos Nearly Phased Out by 2000
3. PDA Displays Moving to Color As Well

**Flip-Flop:** Color portables are the exception today, thanks to high costs and low yields in manufacturing their displays. But by 1998, monochrome laptops will be rare; in fact, their heyday has already passed.

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ThinkPad[SM]

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Comdex Spring
Booth #1906

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*Every Nanao monitor undergoes intense scrutiny and testing to ensure maximum performance and product reliability.*

*At Nanao, details make all the difference in creating our family of professional display monitors. From the product design and manufacturing that takes place in our factory to the end user's working environment, Nanao pays attention to every detail. In engineering. Assembly. Product testing. Quality control. Shipping. Customer support. From the very first days of the company, we set out to be an innovator in monitor technology. And, in a few short years, we have achieved that goal. Today, Nanao has the lowest repair rate in the monitor industry, the highest product reliability, and a fast-growing number of enthusiastic customers. So if you're looking for a superior monitor, start with the details. We do.*

*Nanao monitors feature protective coatings and panels that reduce glare and eliminate static electricity.*

*Nanao was the first monitor company to join in partnership with the EPA Energy Star Program.*

*Nanao T Series and F Series monitors have captured every major award from the industry's leading publications.*

**3 YEAR WARRANTY**

| Model | Size | Dot Pitch | Scan Frequency | Recommended Resolution |
|---|---|---|---|---|
| E660s | 20" | 0.30mm | H 64-82kHz V 55-90Hz | 1280x1024 |
| T560s | 17" | 0.25mm | H 30-82kHz V 50-90Hz | 1280x1024 |
| F700s/W | 21" | 0.28mm | H 48-106kHz V 55-120Hz | 1600x1200 |
| F560s/W | 21" | 0.28mm | H 30-70kHz V 50-90Hz | 1280x1024 |
| F460s/W | 17" | 0.26mm | H 30-83kHz V 50-90Hz | 1280x1024 |
| F450s/W | 17" | 0.26mm | H 27-83kHz V 55-90Hz | 1024x768 |
| F340s/W | 15" | 0.29mm | H 27-61.5kHz V 50-90Hz | 1024x768 |

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## DECISION MAKER

HOW TO BUY THE BEST **COLOR SUBNOTEBOOK** FOR YOUR BUSINESS

| 1 Choose the factor most important to you. | 2 Choose the next most important factor. | 3 What else is important? | 4 For your needs, the best product to buy is . . . |
|---|---|---|---|
| Performance | Battery Life | Display | Toshiba Portégé T3400CT |
| | | Portability | Toshiba Portégé T3400CT |
| | Price | Display | Aspen 486 Color Subnote |
| | | Expandability | Toshiba Portégé T3400CT |
| Price | Performance | Service & Support | Aspen 486 Color Subnote |
| | | Portability | Twinhead SubNote |
| | Battery Life | Durability | Aspen 486 Color Subnote |
| | | Portability | Aspen 486 Color Subnote |
| Battery Life | Portability | Durability | Aspen 486 Color Subnote |
| | | Display | Toshiba Portégé T3400CT |
| | Performance | Ergonomics | Toshiba Portégé T3400CT |
| | | Durability | Toshiba Portégé T3400CT |

PC Best

**Color Subnotebook**

# Toshiba Portégé T3400CT

**PERFORMANCE:** Toshiba's Portégé was faster than the competition in our gut-wrenching Winstone application tests. It's very fast.

**PRICE:** Sure, it's almost $4,000, but you get speed and a great design. We expect the price to drop.

**BATTERY LIFE:** The Portégé ran for nearly three hours in our battery rundown test. It's untouchable.

**PORTABILITY:** It's nearly six pounds, but you get a bigger display and keyboard than on most subnotebooks.

**DURABILITY:** Like its notebook cousin, the Portégé is built like a tank. It aced our durability tests.

**Portégé T3400CT** / Toshiba America / (800) 334-3445 / $3,999
*Circle No. 706 on Reader Service Card*

PHOTOGRAPH BY MARK JOHANN

## Best 200 Systems

### Color Subnotebooks

| Rank | Product | Pros & Cons | Performance 15%* | Price 15% | Battery Life 15% | Display & Ergonomics 15% | Portability 10% | Durability 10% | Documentation & Installation 10% | Ports & Expansion 5% | Service & Support 5% | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Best 1 | **Portégé T3400CT** Toshiba America (800) 334-3445 $3,999 *Reader Service No. 706* | **Pros:** Top performance, long battery life, good keyboard, a display brighter than most full-sized notebooks. **Cons:** You pay to play. | 10 | 7.0 | 10 | 9.9 | 10 | 10 | 9.7 | 9.8 | 10 | **95.0** |
| 2 | **486 Color Subnote** Aspen Computer (800) 472-3273 $1,995 *Reader Service No. 707* | **Pros:** Cheap and sturdy, good battery life, small-but-bright display. **Cons:** Slow, inconvenient trackball. | 7.8 | 8.0 | 8.8 | 8.1 | 8.7 | 9.4 | 9.4 | 9.8 | 10 | **86.5** |
| 3 | **SubNote 4DX2/40S** Twinhead (800) 995-8946 $2,399 *Reader Service No. 708* | **Pros:** Compact, light, nice keyboard, useful LED readout. **Cons:** Cloudy display, slow performance, poor battery life. | 7.0 | 7.8 | 7.4 | 7.6 | 9.6 | 9.1 | 8.9 | 9.6 | 8.5 | **81.4** |

*PERCENTAGES REFLECT THE WEIGHT OF EACH FACTOR IN TOTAL SCORE. FACTORS ARE SCORED ON A SCALE OF 1 TO 10. TOTAL SCORES ARE NORMALIZED TO A SCALE OF 1 TO 100. NOTEWORTHY SCORES ARE HIGHLIGHTED IN RED

### Usability Close-Up
### Toshiba's Answer to the ThinkPad

**Toshiba's AccuPoint** takes the very innovative "eraserhead" idea from IBM's ThinkPad and makes it better by including a palm rest and "mouse" buttons.

**Eraserhead** AccuPoint is handy and comfortable.

### Performance Spotlight: Windows Tests

**Overall scores** for performance (above) are based on Windows and DOS speed tests.

PHOTOGRAPH BY ARNOLD TOSKUD


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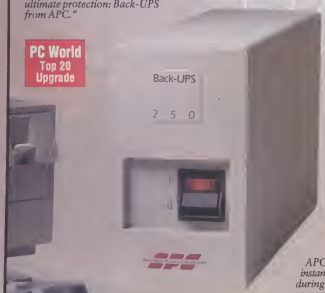


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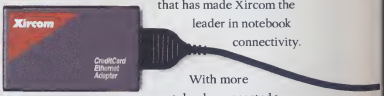
In a matter of seconds, Xircom can connect any notebook to any local area network anywhere.

Simply slide a Xircom CreditCard LAN Adapter into your notebook's PCMCIA slot or plug a Xircom Pocket LAN Adapter into your notebook computer's parallel port.

That's it. There are no tools, batteries or AC adapters required.

It's this plug-and-play simplicity that has made Xircom the leader in notebook connectivity.

## 3.6 Seconds To Be Exact.




With more notebooks connected to more LANs than all other LAN adapter vendors combined.

We make a full line of Pocket and CreditCard adapters for local, remote and cordless notebook-to-LAN connections. All backed by a two-year warranty and a lifetime, half-price upgrade policy.

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**Circle 270 on reader service card.**

# Super-Featherweight 486s Are Set for the Long Haul

You're on the road as much as, if not more than, you're in the office. The last thing you want is more baggage—the one who travels lightest, travels fastest. Laptops have been around for a while, but this year marks the entry of a new category in *PC Computing*'s Best 200: subnotebooks. They're here, they're affordable, and they're for real. If super-lightweight, road-warrior achievers are what you're searching for, search no more. We've found eight products worthy of your consideration.

We required monochrome subnotebooks to have a 25MHz or faster 486 CPU. There were lots of contenders at this level, but we also required the machines to pack at least 4MB of RAM and a 120MB hard drive. This narrowed the field. Then, the clincher of mobile computing commandments: *Subnotebooks shall not weigh more than 5.4 pounds.* After all, the hallmark of subnotebooks is near-weightlessness.

**Factors and Weights** Performance, price, battery life, and display and ergonomics each account for 15 percent of a subnotebook's total score. Performance scores reflect component-specific performance and application throughput. Our battery-life scores are derived from PCbench's Battery Rundown test. Displays are scored on the basis of objective criteria—size, brightness, and contrast—and by overall quality as determined by a jury of technicians and editors. Ergonomics include the layout and response of the keyboard, whether you can "hot swap" batteries without powering the system down, whether a battery gauge is included, the quality of the pointing device, and other design details such as quality and intuitiveness of indicator lights.

Durability, portability, and documentation and installation each count for 10 percent of a subnotebook's score. *PC Computing* Labs measured durability—which takes into account design elements such as the quality of the hinge, port covers, and door latches—and conducted scratch and flex/bend tests. Pointing-device durability is also worthy of consideration. We examined each trackball and mouse and their buttons for location, placement, and functionality. With portables, battery life is your life. Portability scores are based on the machine's size and weight with a battery.

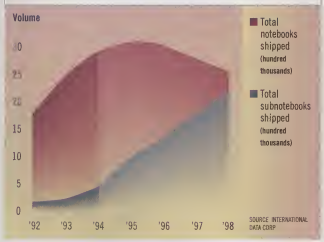
Ports and expansion, and service and support round out the rigors of our testing, each tallying 5 percent of a product's total score. For the ports and expansion factor, high points go to multiple floppy drives, PCMCIA slots, upgradable CPUs, and the availability of docking stations. Products are given high marks for free, round-the-clock service and support. Most are well supported.

**How We Tested** *PC Computing* Labs weighed and then measured each subnotebook, as well as its battery and recharger. We depleted batteries using the PCbench Battery Rundown test, then recharged them, repeating the process three times.

We evaluated each subnotebook's performance by running PCbench and Winbench tests as well as the DOSmark and Winstone test suites. We also ran Coretest, which measures a system's data transfer rate and average hard-drive seek times. We evaluated the brightness and contrast of each subnotebook's display using a jury of technicians and editors. In the durability testing process, we repeatedly opened and closed each subnotebook, noting its seal and quality, and subjected the machines to flex tests, hinge examinations, and scratch trials. RICH SCHWERIN

**Market Trends: Monochrome Subnotebooks**

1. Sub-5-pound PCs Growing Fast and Furious
2. Subnotebooks Replacing Notebooks
3. Technology Leaps Help Subnotebooks




**The Heyday of the Tiny PC:** After being held back by low-capacity drives, poor battery life, and awkward designs, sub-5-pound portables are finally ramping up for success. Expect them to supplant notebooks in many cases.

# THE COMM PROGRAM FOR THOSE WHO INSIST ON TAKING THE EASY WAY OUT.

Our users know it. The reviews and awards confirm it. And the increasing number of people moving to Crosstalk® for Windows proves it.

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We make communicating easier with features like our QuickBar toolbar and our QuickPad™ editor, which lets even non-programmers build customized controls for frequent sessions. And those are just a couple of the reasons why Crosstalk has been the *PC Magazine* Editors' Choice for the last two years.

Everything about the Crosstalk interface is designed for speed and convenience. And naturally, along with all that ease-of-use, you get the unmatched power that Crosstalk has always been known for. *PC World* wrapped up its recent review by saying, "Thanks to its clean and easy-to-use interface backed by its solid set of emulations and transfer protocols, strong scripting capabilities and remote access tools, Crosstalk easily rates a Best Buy."

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*"If you like a clean, uncluttered Windows interface with some of the best-designed icons anywhere, Crosstalk won't disappoint."*
— PC World *Best Buy, November 1993*

*You can easily create your own customized QuickPads, or use our pre-built ones for on-line services.*

DCA

*The Freedom To Communicate.*

**Circle 260 on reader service card.**

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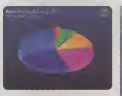
# *Science has found a cure for snoring. At least during your presentation.*

It's the new Phaser™ 220 color printer by Tektronix®. It's affordable. It's easy to use. And it's the best way to keep people awake without the use of costly stimulants. How? Quite simply, amazing color. The Phaser 220's SuperCell 600™ technology allows you to print a whopping 600 x 300 dots-per-inch. And in lay terms, that's a lotta dots. And a lotta dots means your annual reports will yodel, your pie charts will do backflips and your bar graphs will announce their presence with authority. Plus you get all this great color at two pages per minute on most common laser papers. At this speed, it should come with an airbag. The Phaser 220 also offers true Adobe® PostScript™ Level 2 and supports PCs, Macs, workstations and just about every network interconnect. Add to this the fact that it's reliable, has multiple paper trays and a huge print capacity and you've got yourself one tough workhorse. For a free Phaser 220 print sample or the name of your nearest Tektronix dealer, call **800-835-6100**, department 34D. For faxed information, call 503-682-7450, and ask for document #5003. But don't wait too long. Because business is getting more and more competitive. And if you snooze, you lose.



*Overheads*

*Desktop Publishing*

*Reports*

*The Phaser 200 series starts at a suggested retail price of only $2,995. Who says money can't buy happiness?*

**Tektronix**

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## DECISION MAKER

BUY THE BEST **MONOCHROME SUBNOTEBOOK** FOR YOUR BUSINESS

| 1 Choose the factor most important to you. | 2 Choose the next most important factor. | 3 What else is important? | 4 For your needs, the best product to buy is . . . |
|---|---|---|---|
| Performance | Price | Portability | IBM ThinkPad 500 |
| | | Battery Life | Zenith Z-Lite 486 |
| | Battery Life | Portability | Toshiba Portégé T3400 |
| | | Display | Toshiba Portégé T3400 |
| Price | Performance | Ergonomics | Hyundai Neuron Lite |
| | | Display | Compaq Contura Aero 4/25 |
| | Battery Life | Display | Zenith Z-Lite 486 |
| | | Portability | HP OmniBook 430 |
| Battery Life | Price | Portability | HP OmniBook 430 |
| | | Display | IBM ThinkPad 500 |
| | Performance | Service & Support | Toshiba Portégé T3400 |
| | | Ergonomics | Toshiba Portégé T3400 |

PC Best

### Monochrome Subnotebook

# Toshiba Portégé T3400

**PERFORMANCE:** This was one of many scoring categories in which Toshiba's Portégé T3400 chalked up a perfect 10. It's a rocket.

**PRICE:** It costs about $1,000 more than some others, but the speed, extras, and design are worth it.

**BATTERY LIFE:** In our tests, the Portégé T3400 went for nearly 4.5 hours. No other system came close.

**DURABILITY:** The case and design are flawless. This machine's nearly unscratchable and rugged throughout. You can even drop it.

**PORTABILITY:** At less than 4.2 pounds, portables hardly get any lighter. You won't mind the weight.

PHOTOGRAPH BY MARK JOHANN

**Portégé T3400** / Toshiba America Information Systems / (800) 334-3445 / (714) 583-3000 / $2,599
*Circle No. 709 on Reader Service Card*

# Best 200 Systems

## Monochrome Subnotebooks

| Rank | Product | Pros & Cons | Performance 15%* | Price 15% | Battery Life 15% | Display & Ergonomics 15% | Durability 10% | Portability 10% | Documentation & Installation 10% | Ports & Expansion 5% | Service & Support 5% | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PC Best 1 | **Portégé T3400**<br>Toshiba America<br>(800) 334-3445<br>$2,999<br>*Reader Service No. 709* | **Pros:** Feature-packed performance screamer, near-eternal battery life.<br>**Cons:** Expensive, the portability needs work. | 10 | 7.0 | 10 | 10 | 10 | 7.4 | 9.0 | 8.0 | 9.0 | 90.4 |
| 2 | **ThinkPad 500**<br>IBM<br>(800) 772-2777<br>$1,699<br>*Reader Service No. 710* | **Pros:** Outstanding pointing device, near-perfect display, tough enough.<br>**Cons:** Limited ports, a little heavy. | 8.9 | 9.6 | 9.2 | 9.3 | 9.6 | 7.8 | 9.0 | 7.0 | 8.0 | 89.4 |
| 3 | **OmniBook 430**<br>Hewlett-Packard<br>(800) 722-7461<br>$1,399<br>*Reader Service No. 711* | **Pros:** Super-flyweight, nice price, well documented, plenty of ports.<br>**Cons:** Poor ergonomic mouse location, sluggish performance. | 7.0 | 10 | 9.3 | 7.6 | 8.1 | 10 | 10 | 10 | 8.0 | 88.0 |
| 4 | **Contura Aero 4/25**<br>Compaq Computer Corp.<br>(800) 345-1518<br>$1,399<br>*Reader Service No. 712* | **Pros:** One of the least expensive, outstanding service and support.<br>**Cons:** Battery life is too short, less-than-decent durability. | 8.2 | 10 | 7.3 | 8.7 | 7.7 | 9.2 | 9.0 | 8.0 | 10 | 86.2 |
| 5 | **Z-Lite 486 Model 170**<br>Zenith Data Systems<br>(800) 553-0331<br>$1,699<br>*Reader Service No. 713* | **Pros:** Serious price contender, beautiful display, above-average battery life.<br>**Cons:** Uncomfortable keyboard, a bit weighty. | 8.3 | 9.6 | 8.9 | 9.0 | 7.5 | 7.3 | 9.0 | 9.0 | 8.0 | 86.0 |
| 6 | **HandBook 486**<br>Gateway 2000<br>(800) 846-2000<br>$1,495<br>*Reader Service No. 714* | **Pros:** Low price runner-up, light weight.<br>**Cons:** Display proportions are nonstandard and awkward. | 8.0 | 9.9 | 8.1 | 7.1 | 7.8 | 9.2 | 9.0 | 8.0 | 8.0 | 83.7 |
| 7 | **Neuron Lite**<br>Hyundai Electronics<br>(800) 627-7978<br>$1,614<br>*Reader Service No. 715* | **Pros:** Priced with the leaders, middle-of-the-road performance.<br>**Cons:** Nearly heavy enough to be a notebook, lackluster battery endurance. | 8.5 | 9.8 | 7.2 | 8.2 | 7.7 | 7.0 | 9.5 | 9.0 | 8.0 | 83.3 |
| 8 | **SubNote 4DX/33M**<br>Twinhead Corp.<br>(800) 995-8946<br>$1,999<br>*Reader Service No. 716* | **Pros:** Thorough, well-presented documentation; ergonomic design.<br>**Cons:** Battery life needs improvement, lackluster durability. | 8.5 | 8.7 | 7.0 | 7.5 | 7.0 | 7.2 | 9.0 | 8.0 | 7.0 | 78.3 |

*PERCENTAGES REFLECT THE WEIGHT OF EACH FACTOR IN TOTAL SCORE. FACTORS ARE SCORED ON A SCALE OF 1 TO 10. TOTAL SCORES ARE NORMALIZED TO A SCALE OF 1 TO 100. NOTEWORTHY SCORES ARE HIGHLIGHTED IN RED

## Usability Close-Up
### Take It or Leave It

**Zenith's Z-Lite 486 Model 170** is both very expandable and very easily customizable. Its floppy drive is also simple to remove, as is its trackball. The Z-Lite subnotebook also comes with a slew of helpful external options.

**Options, Options** You can customize the Z-Lite to meet your road needs.

## Performance Spotlight: Windows Tests

**Overall scores** for performance (above) are based on Windows and DOS speed tests.

PHOTOGRAPH BY ARNOLD TOSKUD

PHOTOGRAPH BY DAVID PERRY

## PAUL SOMERSON **XPS P90 & ThinkPad**

Describe your dream multimedia system: Blistering performance. Retina-rippling graphics. Rock-solid construction. Friend-of-the-owner service and support. And more ports and bays than the Atlantic seaboard. Or, in other words, Dell's Dimension XPS P90. This Pentium powerhouse blows the doors off every other machine we tested. It's neck-snapping fast. Neutrino fast. You'll want to bolt it to your desk. If the Beach Boys used PCs they'd write a song about it. And the road machine of choice? Easy. IBM's sleek ThinkPad 750C. Anyone who doesn't covet one shamelessly needs a check-up from the neck up. Its keyboard puts all others to shame. Its drop-dead styling, huge color screen and sexy pointing device are the standards every other vendor is chasing. As business weapons go, it's the digital Uzi.

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You want the truth? Here it is. NEC's new MultiSpin® 3X CD-ROM readers are the best-performing readers on the market.

We were the first to introduce double speed. And now we improved our data transfer rate to 450 Kbytes/sec. and made a triple-speed reader. (Because that's what you wanted.) We also cut our access time to less than 200 milliseconds, added a 256-Kbyte continuous-flow cache, and a SCSI 2 interface.

Which means you can get your information three times faster than you can with standard readers, see smoother animation and video.

*NEC MultiSpin 3Xp and 3Xe*

Our new MultiSpin CD-ROM readers are not only fast but interactive, with stand-alone audio controls and an LCD display on the front panel. So you don't have to rely on your computer to tell you what's going on (or not going on) with your reader.

They're compatible with Macs and PCs, as well as Kodak Multisession Photo CDs. And, they come with the longest commitment in the industry – a 2-year limited warranty.

For more information, call 1-800-NEC-INFO. Or for details via fax, call NEC FastFacts™ at 1-800-366-0476, request document #23768. We'll answer all your questions about CD-ROM. And you'll actually get to have an honest conversation for a change.

**Circle 157 on reader service card.**

NEC

Best 200

Trotters, Workhorses, and Network Thoroughbreds . . .

# Printers

**SYNOPSIS**


**4-PPM LASER PRINTERS:** *On a budget? We found rock-bottom prices you'll be sure to like.* **156**

**NETWORK COLOR PRINTERS:** *Our jury testers homed right in on the splashiest output ever.* **160**

**8-PPM NETWORK PRINTERS:** *Small workgroups take note: Some of these printers are true speedsters.* **166**

**18-PPM NETWORK PRINTERS:** *The winner was 40 percent faster than the runner-up.* **170**

**EDITOR'S CHOICE:** *Color printers cost you? Not this time.* **175**


Pick a printer—any printer. Well, OK, not just any printer. If the security and convenience of having a printer next to your desk is important to you, check out a personal laser printer. At four pages per minute, it won't set any speed records, but the tremendous competition in this category means you can expect record lows on the price tag. The newest entries include Windows-specific models that require less RAM and printer logic.

Feel the need for speed? In the 8-page-per-minute (ppm) network class, the most noticeable differences are in image quality. Standard resolution is 600 dpi, a great leap forward from the 300 dpi that's typical in personal printers. And installing a network printer no longer requires an engineering degree or knowledge of voodoo—the usability champs are plug-and-print easy.

For larger workgroups, the pace heats up to 18 ppm or more. When print jobs are coming from every direction, networking ease is the crucial buying factor. Multiple network protocols, a variety of ports, and the ability to handle different printer emulations without flinching—these are the usability traits that define the winning network printers.

And then there's the color arena, where prices are dropping from eye-popping to affordable. Color is still far from the norm in business, mostly because of cost—not only up front but every day, thanks to expensive consumables that force you to think in dollars per page instead of the other way around. Still, the spectrum of affordable color options is wide. You can get QMS's ColorScript Laser 1000 at just under $10,000 (half the cost of its nearest color laser competitor). The dirt-cheap alternative is a $1,200 ink jet printer.

With color printers, you get what you pay for. You'll pay more if you want the highest quality. Use the *PC Computing* Decision Maker on page 161 to work out the options.

While Hewlett-Packard continues to lead in the laser printer area, snagging top honors in two of our four categories, they're inspiring the competition to offer usability features. Check out the neat bells and whistles that caught our eye and will certainly save you from output aggravation.

ED BOTT

**A IN LIVING COLOR:** One of the few color laser (as opposed to solid ink) network printers, **QMS's ColorScript Laser 1000** comes with four toner cartridges, one for each splashy color.

**B ALL-AROUND FRIENDLY:** Pick a network—at 18 ppm, **Lexmark's IBM LaserPrinter 4039 16L** printer can connect to Ethernet and AppleTalk networks, or to a parallel port. Add the I/O card for better throughput.

**C EASY MAKEOVER:** For smaller groups, just add a network card to **Hewlett-Packard's LaserJet 4M** 8-ppm printer—and its finger screws mean no tools are necessary.

PHOTOGRAPHS BY MARK JOHANN

A

Having it all on disk can't always compete with having information in hand.

B

New, cheaper printers boast bright color, fast output, and better networking.

C

# Ultra-Cheap Lasers Just Might Surprise You

Laser printers aren't luxury items anymore. In fact, they're downright bargains—perfect for the desktop. But if you think that means they're restricted to the desktop, think again. Got a small workgroup of four or five people? If your printing needs aren't demanding and you primarily print text, you can save a bundle by sharing a 4-page-per-minute (ppm) printer. Laser printers don't come any cheaper, and when it comes to personal printers, price counts.

Each of the personal printers we tested supports at least 300-by-300-dpi resolution and prints at a minimum rate of 4 ppm. Often actual speeds were higher than 4 ppm. In most cases, the standard memory configuration is enough to print even the most complex images. Our performance scores take into account whether printers required extra memory.

**Factors and Weights** These printers are a dream come true for the price-conscious consumer. The distinguishing characteristics among them are price and performance, in that order. Consequently, 30 percent of each printer's total score is based on price, and 25 percent on performance. Next to cost and speed, most users base their buying decision on the quality of the output. And because you usually need to print both text and graphics, we tested both kinds of documents. In fact, we threw several kinds of text and graphics at each printer. Output quality accounts for 15 percent of the total score.

Ease of installation, which measures how easy it is to initially set up the printer, contributes 10 percent to the total score. Documentation, installation instructions, and ease of maintenance each contributes 5 percent. Service and support, where we look for on-site service, 800-number technical support, BBS support, and fax-back support, account for 5 percent of the final score.

**How We Tested** To test each printer's ability to produce a range of business documents, ZD Labs printed files from a variety of business applications: a 10-page text document in WordPerfect 6.0a for DOS using printer-resident fonts; a 10-page text document in Microsoft Word 6.0 for Windows using two non-resident TrueType fonts; a 3-slide composite document in Microsoft PowerPoint 3.0 for Windows composed of graphics, text, and fills; and a 1-page graphics document in CorelDraw 3.0 for Windows. Output quality was judged by a panel that scrutinized the first text page of the Microsoft Word document and the graphics page printed in the CorelDraw test. This panel of jury testers was impressed with the consistently top-notch output from this often-maligned class of printers. Unless your output demands are stringent (splashy graphics, etc.), you'll be impressed, too.

Ease of installation, documentation, installation instructions, and ease of maintenance were scored based on a checklist of significant criteria. We found big differences between the products in these areas. Documentation scores took into account inclusion of an index, online help, a troubleshooting section, a list of error messages, and the presence of a quick-reference guide. Installation instructions were scored separately from overall documentation because help during setup is so crucial with these entry-level printers. In some cases, installation instructions were lucid and complete, but installation itself was still tricky. For the most part, however, getting each printer set up was easy, and took less than 15 minutes.

NATHAN GARCIA

## Technical Checkpoints: 4-ppm Laser Printers

1. Speed (ppm) to Match Number of Users
2. Ability to Upgrade Boards or Processors
3. Ability to Add Optional Equipment

**A.** The **LCD and menu buttons** should display error messages and fixes.

**B.** The **paper train** should be accessible so that jammed sheets can be removed easily.

**C.** You need access to **toner cartridges** without removing components.

**Prints Charming:** To get the right printer for the right workgroup, estimate a page-per-minute output rate for each user (eight users equals an 8-ppm printer). As needs change, be sure you can add options such as extra paper trays.

## DECISION MAKER

HOW TO BUY THE BEST **4-PPM LASER PRINTER** FOR YOUR BUSINESS

**1** Choose the factor most important to you. **2** Choose the next most important factor. **3** What else is important? **4** For your needs, the best product to buy is . . .

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| Price | Performance | Ease of Maintenance | Epson ActionLaser 1500 |
| | | Service & Support | Canon LBP-430 |
| | Documentation | Ease of Maintenance | HP LaserJet 4L |
| | | Service & Support | Canon LBP-430 |
| Performance | Price | Ease of Installation | Brother HL-6V |
| | | Documentation | Epson ActionLaser 1500 |
| | Ease of Installation | Ease of Maintenance | Brother HL-6V |
| | | Service & Support | Brother HL-6V |
| Output Quality | Price | Ease of Maintenance | Epson ActionLaser 1500 |
| | | Installation Instructions | Epson ActionLaser 1500 |
| | Performance | Ease of Installation | Epson ActionLaser 1500 |
| | | Service & Support | Epson ActionLaser 1500 |

PC Best

### 4-ppm Laser Printer

# Epson ActionLaser 1500

**PRICE:** At $849, the ActionLaser 1500 is reasonably priced, although it's not the cheapest.

**PERFORMANCE:** The ActionLaser 1500 stood out in each speed test we threw at it. It printed all kinds of documents—fast.

**OUTPUT QUALITY:** The best in our jury tests, thanks to technology that smooths out the jagged edges on its 37 resident fonts.

**EASE OF INSTALLATION:** Just insert the one-piece toner cartridge, connect the cables, and print—what could be easier? We're impressed.

**DOCUMENTATION:** Well illustrated and organized, the manual incorporates a troubleshooting checklist. Good presentation.

**ActionLaser 1500** / Epson / (800) 298-3776 / $849

PHOTOGRAPH BY MARK JOHNSON

# Best 200 Printers

## 4-ppm Laser Printers

| Rank | Product | Pros & Cons | Price 30%* | Performance 25% | Output Quality 15% | Ease of Installation 10% | Documentation 5% | Installation Instructions 5% | Ease of Maintenance 5% | Service & Support 5% | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PC Best 1 | **ActionLaser 1500**<br>Epson America<br>(800) 298-3776<br>$849 | **Pros:** Good performance in every speed test we threw its way, outstanding support, includes PostScript.<br>**Cons:** Documentation was fair. | 9.6 | 10 | 10 | 9.8 | 9.1 | 10 | 9.4 | 10 | 97.9 |
| 2 | **Brother HL-6V**<br>Brother Int'l<br>(800) 276-7746<br>$865<br>*Reader Service No. 721* | **Pros:** Fast in all speed tests, easy to configure and maintain.<br>**Cons:** Poor graphics quality, documentation had significant holes and was not well presented. | 8.6 | 10 | 7.0 | 10 | 7.3 | 8.5 | 10 | 10 | 89.2 |
| 3 | **Canon LBP-430**<br>Canon<br>(800) 848-4123<br>$799<br>*Reader Service No. 722* | **Pros:** Lowest price is set to impress, top-notch service and support.<br>**Cons:** Slow performance in most speed tests, though this wasn't the slowest printer. | 10 | 7.2 | 8.6 | 8.9 | 10 | 9.5 | 8.2 | 10 | 88.7 |
| 4 | **LaserJet 4L**<br>Hewlett-Packard<br>(800) 752-0900<br>$849<br>*Reader Service No. 723* | **Pros:** Easy maintenance, reasonable price.<br>**Cons:** Slowest on speed tests overall, performance lagged with both text and graphics. | 9.6 | 6.7 | 7.9 | 9.1 | 9.1 | 9.0 | 9.9 | 9.0 | 85.0 |
| 5 | **Panasonic KX-P4430**<br>Panasonic<br>(800) 742-8086<br>$689<br>*Reader Service No. 724* | **Pros:** Good service and support.<br>**Cons:** Incomplete installation instructions, though documentation was otherwise thorough. | 9.4 | 8.1 | 7.3 | 7.8 | 9.1 | 8.0 | 8.8 | 9.0 | 84.7 |
| 6 | **Okidata OL410e**<br>Okidata<br>(800) 654-3282<br>$899<br>*Reader Service No. 725* | **Pros:** Good output quality in all tests, jury testers were impressed.<br>**Cons:** Slow performance in every speed test, but the LaserJet 4L was slower. | 9.2 | 7.0 | 9.9 | 7.0 | 9.1 | 7.0 | 7.3 | 10 | 83.7 |
| 7 | **Sharp JX-9460PS**<br>Sharp<br>(800) 237-4277<br>$1,199<br>*Reader Service No. 726* | **Pros:** Includes PostScript, easy maintenance.<br>**Cons:** High price, few service-and-support extras compared with the others. | 7.7 | 8.0 | 7.4 | 8.9 | 9.1 | 8.5 | 9.6 | 7.0 | 80.2 |
| 8 | **LaserJet 4ML**<br>Hewlett-Packard<br>(800) 752-0900<br>$1,279<br>*Reader Service No. 727* | **Pros:** Easy maintenance and good installation instructions, despite some setup problems.<br>**Cons:** Rather expensive for its class, slow. | 7.4 | 7.2 | 7.3 | 9.1 | 9.1 | 8.5 | 9.4 | 9.0 | 78.3 |

* PERCENTAGES REFLECT THE WEIGHT OF EACH FACTOR IN TOTAL SCORE. FACTORS ARE SCORED ON A SCALE OF 1 TO 10. TOTAL SCORES ARE NORMALIZED TO A SCALE OF 1 TO 100. NOTEWORTHY SCORES ARE HIGHLIGHTED IN RED.

## U Usability Close-Up
### Brother's Friendly Greeting

We love what Brother has done to make setting up the **HL-6V** printer a breeze. The front panel even has a little greeting sticker with arrows and descriptive captions for the buttons you'll need to use. All you have to decide is how you want it configured.

**Cryptic Buttons?** Just the opposite. We liked the HL-6V's interactivity.

## P Performance Spotlight: Output Rates

**Overall scores** for performance (above) are based on output speeds for several file formats.

PHOTOGRAPH BY ARNOLD TOSKO

# cheap and fast

**We're proud of our printer's reputation.** And we're also proud of the Silentwriter® 1097's many features. Features like 600 DPI print quality, and PhotoMatch™ grayscaling. Along with PC and Macintosh connectivity, Adobe PostScript™ software, HP® LaserJet® III emulation, plus Automatic Emulation Switching. Our Novell network capability. Not to mention our extremely fast RISC-based 10ppm print speed. With all of these features for under $1500 it doesn't matter what you call us. As long as you call 1-800-NEC-INFO. Or for information via fax, call NEC FastFacts™ at 1-800-366-0476, request document #791097.

NEC

**Circle 243 on reader service card.**

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# Connectivity, Color, Class—What More Could You Want?

When it comes right down to it, all our documents could stand to look a little better. But the best way to spice up documents—adding color—still costs a fortune by today's printing standards. It doesn't have to be that way, though. You can put your color printer on a network and let everyone share in the wealth.

Color printers are following in the footsteps of their black-and-white counterparts. Slowly but surely, more and more companies are offering network color printers in addition to their standalone models. And color printers don't have to be just for the graphics department. Any business document will get the message across better with color—be it a color chart of last quarter's profits or color handouts for that big presentation.

There are quite a few technologies to choose from when you purchase a color printer. We tested thermal wax-transfer, ink jet, dye-sublimation, phase change, color laser, and solid ink printers. Your needs should dictate your purchase. Will add only spot color to documents that contain mostly text? Do you plan to print transparencies? Your first task is to examine the kinds of color documents you plan to produce on a regular basis. Then you'll know what features to look for.

Our requirements for color network printers were simple: A printer had to offer a direct internal Ethernet connection and had to include drivers for Novell NetWare 3.x and support IPX/NetWare/802.3. We asked for printers with memory configured as close to 12MB as possible. When scoring prices, we considered the list price, plus the additional cost (if any) of an Ethernet option, and the cost of additional memory.

**Factors and Weights** Output quality is generally the primary concern among users, so that factor accounts for 20 percent of the total score. But output quality is not the only concern. Chances are that performance and price will also be at the top of most users' lists. Each of those factors also accounts for 20 percent of the final score.

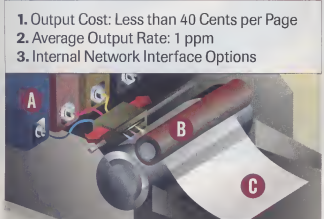
Most businesses can't afford a color printer for every desktop, so they cut costs by putting color printers on a network. We evaluated the network features for each printer, and that score accounts for 15 percent of the total. Service and support, at 10 percent, is important because these printers aren't always a snap to set up and get running on a network.

We rate documentation, ease of installation, and ease of maintenance at 5 percent each. Like service and support, these features are important once you get your printer running—you'll want to know how easy it is to change consumables or fix paper jams.

**How We Tested** ZD Labs tested performance by printing a variety of documents from several business applications that color-printer owners are likely to use. The test files included a Microsoft PowerPoint 3.0 for Windows document composed of text and graphics, typical of a business presentation; three unique one-page Photoshop 2.5 for Windows documents, each of which contained a color photographic TIFF image; three 1-page documents from CorelDraw 3.0 for Windows that contained images consisting of text and graphics; and a 1-page Aldus PageMaker 5.0 for Windows document consisting of a color photographic image, PostScript graphics, horizontal and vertical color and gray ramps, rules of varying thickness, an RGB target, a registration target, a full-bleed border, and regular black text. We also used this last document for our jury test to determine the overall print quality for each document. KYLA K. CARLSON

## Technical Checkpoints: Network Color Printers

1. Output Cost: Less than 40 Cents per Page
2. Average Output Rate: 1 ppm
3. Internal Network Interface Options




A. The four **ink cartridges** should be easy to replace.

B. **Solid-ink rollers** fuse colors in sharper detail than thermal wax-transfer printers.

C. Be sure you can use regular and coated **paper stock.**

**Price Advice:** To be more exact when figuring average price per page, estimate 1 cent per percentage of page covered—for example, 50 percent coverage equals 50 cents. Ditto for speed—the larger the graphic, the slower the output.

## DECISION MAKER

HOW TO BUY THE BEST **NETWORK COLOR PRINTER** FOR YOUR BUSINESS

**1** Choose the factor most important to you. **2** Choose the next most important factor. **3** What else is important? **4** For your needs, the best product to buy is . . .

| | | | |
|---|---|---|---|
| Output Quality | Performance | Service & Support | Tektronix Phaser 480 |
| | | Network Features | Tektronix Phaser 480 |
| | Service & Support | Ease of Installation | Tektronix Phaser 480 |
| | | Price | Tektronix Phaser 220i |
| Performance | Output Quality | Price | Tektronix Phaser 220i |
| | | Service & Support | Tektronix Phaser 480 |
| | Network Features | Ease of Maintenance | Tektronix Phaser 300i |
| | | Service & Support | Tektronix Phaser 300i |
| Price | Performance | Output Quality | HP DeskJet 1200C/PS |
| | | Network Features | HP DeskJet 1200C/PS |
| | Output Quality | Service & Support | Tektronix Phaser 220i |
| | | Ease of Maintenance | HP DeskJet 1200C/PS |

PCC Best

### Network Color Printer

# Tektronix Phaser 220i

**OUTPUT QUALITY:** The Phaser 220i produced colors that were remarkably true to the original image.

**PERFORMANCE:** The Phaser 220i performed especially well on the photographic images that usually keep you waiting the longest.

**PRICE:** It won't break the bank, either—its $7,085 list price includes an Ethernet option and 14MB of memory.

**NETWORK FEATURES:** Tektronix provides a configuration program that makes network setup a breeze.

**SERVICE AND SUPPORT:** Well-organized documentation is backed by top-notch service and support.

**Phaser 220i** / Tektronix / (800) 835-6100 / $7,085
*Circle No. 728 on Reader Service Card*

PHOTOGRAPHY BY MARK JOHANN

# Best 200 Printers

## Network Color Printers

| Rank | Product | Pros & Cons | Output Quality 20%* | Performance 20% | Price 20% | Network Features 15% | Service & Support 10% | Documentation 5% | Ease of Installation 5% | Ease of Maintenance 5% | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 (Best) | **Phaser 220i** (Thermal wax-transfer) Tektronix (800) 835-6100 $7,085 *Reader Service No. 728* | **Pros:** Fast, supports 600-by-300-dpi resolution, reasonable price, plain-paper printing. **Cons:** No PCL 5 support in color printing. | 8.4 | 10 | 8.9 | 9.6 | 10 | 9.5 | 9.8 | 8.5 | 92.9 |
| 2 | **DeskJet 1200C/PS** (Ink jet) Hewlett-Packard (800) 752-0900 $3,777 *Reader Service No. 729* | **Pros:** Rock-bottom price, impressive speed on photographic output, a snap to configure. **Cons:** Average output quality, slow performance on business graphics. | 7.9 | 9.3 | 10 | 9.6 | 9.6 | 8.1 | 9.6 | 10 | 92.3 |
| 3 | **Phaser 480** (Dye-sublimation) Tektronix (800) 835-6100 $16,085 *Reader Service No. 730* | **Pros:** Gorgeous output, second-fastest printer overall, configuration is a breeze. **Cons:** Most expensive, highest cost per page, no PCL 5 support. | 9.9 | 9.8 | 7.0 | 9.3 | 10 | 9.5 | 10 | 9.3 | 91.8 |
| 4 | **Phaser 300i** (Phase change) Tektronix (800) 835-6100 $11,085 *Reader Service No. 731* | **Pros:** Fast performer, great network features, a breeze to configure, supports plain-paper printing. **Cons:** Expensive. | 8.7 | 9.3 | 7.9 | 10 | 10 | 9.5 | 10 | 9.5 | 91.3 |
| 5 | **ColorScript Laser 1000** (Laser) QMS (800) 523-2696 $9,999 *Reader Service No. 732* | **Pros:** Fast on business graphics, helpful front-panel display, includes PCL 5 and 60MB hard drive. **Cons:** Unimpressive output quality, high price, difficult to configure. | 7.7 | 8.8 | 8.1 | 9.6 | 9.4 | 9.1 | 8.0 | 7.0 | 85.1 |
| 6 | **ColorScript 210** (Thermal wax-transfer) QMS (800) 523-2696 $4,894 *Reader Service No. 733* | **Pros:** Low price. **Cons:** No PCL support, below-average output quality, unimpressive performance. Too hard to configure. | 7.6 | 7.4 | 9.6 | 9.6 | 9.6 | 7.4 | 7.2 | 9.0 | 85.0 |
| 7 | **ColorScript 230** (Thermal wax-transfer) QMS (800) 523-2696 $7,355 *Reader Service No. 734* | **Pros:** Supports tabloid-sized printing. **Cons:** No PCL support, slow performance, below average output quality, network setup was difficult. | 7.6 | 7.4 | 8.8 | 9.6 | 9.6 | 7.0 | 7.6 | 7.5 | 82.7 |
| 8 | **Jolt PSe** (Solid ink) Dataproducts Corp. (800) 880-0374 $6,310 *Reader Service No. 735* | **Pros:** Low price, great support options. **Cons:** Worst output and slowest speed, difficult network setup. | 7.0 | 7.0 | 9.1 | 8.5 | 10 | 8.1 | 7.0 | 9.0 | 81.0 |

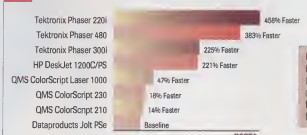
*PERCENTAGES REFLECT THE WEIGHT OF EACH FACTOR IN TOTAL SCORE. FACTORS ARE SCORED ON A SCALE OF 1 TO 10. TOTAL SCORES ARE NORMALIZED TO A SCALE OF 1 TO 100. NOTEWORTHY SCORES ARE HIGHLIGHTED IN RED.

## Usability Close-Up: Color Me Happy

**Dataproducts' Jolt PSe** printer uses solid-ink technology, so the consumables consist of four cartridges that contain pellets similar to pieces of crayon. This means no messing with toner that can seep where it shouldn't.

**Canny Cartridges** Dataproducts makes them easy to pop in.

## Performance Spotlight: Photo Output




**Overall scores** for performance (above) are based on output speeds for several file formats.

PHOTOGRAPH BY ARNOLD TOSELIO

BLACK HOLE (ARTIST'S CONCEPTION)

# "THIS MEETING WAS SUPPOSED TO START A HALF HOUR AGO. WHERE IS EVERYBODY?"

It's a proven fact. Busy schedules and poor communication create black holes

that suck up co-workers just before the big meeting. Scientists can explain a lot about these powerful gravitational fields, but they can't help you get people together on time.

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You simply choose who you want to attend from the ccMail directory. Organizer shows you a graphical view of their busy and free times so you can pick out the optimal meeting time. Then Organizer delivers an invitation via ccMail. Invitees can accept, decline or delegate to someone else – with a single mouse click. Organizer tracks responses automatically. No searching for missing co-workers. No phone tag. Just the easiest way ever to plan a meeting.

Organizer's group scheduler displays a user's *availability only*, not the entire schedule, so everyone's privacy is protected. And invitations can be sent to anyone on the ccMail network, even if they don't use Organizer.

*Lotus Organizer with group scheduling takes the guesswork – and the footwork – out of meeting planning.*

Needless to say, Organizer does more than plan meetings. Organizer includes an on-screen calendar, an automated to-do list, an address book, note pad and anniversary reminder – Organizer will even sound an alarm to remind you of a commitment, like that meeting you're invited to.

There are three ways you can get Organizer: on its own, with ccMail in the 10-user group pack, or for an even better deal upgrade to SmartSuite®– a suite of five top-notch, fully integrated business applications, including Organizer– for just $299.* Call **1-800-872-3387, ext. 9517**, or visit your Lotus Authorized Reseller. Because, as common as they are, black holes at work are now entirely preventable.

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**ValuePoint Mini-Tower 6387 Server**

- i486™DX2/66MHz processor
- 527MB Hard Disk
- 8MB RAM
- IBM 14L8 14" Color Monitor (SVGA)
- Ethernet interface card
- IBM DOS and NetWare from IBM V.3.12 – 5 users

**ValuePoint Si Clients (3)**

- i486SX/25MHz processor
- 120MB Hard Disk
- 4MB RAM
- IBM 14L8 14" Color Monitor (SVGA)
- Ethernet interface card
- IBM DOS and NetWare from IBM Client

- **Price: $8,359***

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**Whether you're networking 2 or 250 users, there's an IBM server that can do the job.** Through NET Select, you can choose from either an IBM ValuePoint Mini-Tower or an IBM PS/2 Server 85 466.

### ValuePoint Mini-Tower 6387

- **CPU:** 486DX/33MHz** or i486DX2/66MHz processor
- **Storage:** 527MB Hard Disk, and one optional 170, 245, 340, 424 or 527MB Hard Disk
- **Memory:** 8MB RAM standard, upgradable to 64MB
- **Network Interface Card:** Ethernet or Token-Ring
- **Operating Environment:** IBM DOS with NetWare from IBM V.3.12 or IBM OS/2 LAN Server 3.0, Entry
- **Prices start at $3,029*** (monitor not included)

### PS/2 Server 85 466

- **CPU:** i486DX2/66MHz processor with 256KB L2 (write-back) cache, upgradable to Intel® Pentium® OverDrive™
- **Storage:** 540MB or 1GB SCSI-2 fast Hard Disk and four optional 540MB, 1GB or 2GB Hard Disks. Standard SCSI-2 fast and wide data streaming busmaster controller
- **Memory:** 8MB RAM standard, upgradable to 232MB
- **Network Interface Card:** Ethernet or Token-Ring
- **Operating Environment:** IBM DOS with NetWare from IBM V.3.12 or IBM OS/2 LAN Server 3.0, Entry
- **Prices start at $5,779*** (monitor not included)

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### ValuePoint client configuration options

- **CPU:** i486SX/25MHz to i486DX2/66MHz processor
- **Storage:** 120MB Hard Disk, up to 527MB
- **Memory:** 4MB RAM standard, upgradable to 64MB
- **Monitor:** IBM 14L8 14" Color Monitor (SVGA)
- **Network Interface Card:** Ethernet or Token-Ring
- **LAN Requester:** NetWare from IBM Client, or OS/2 LAN Server Requester
- **Applications:** Choose from popular business software applications available preloaded from IBM Soft Select
- **Prices start at $1,519*** (prices may vary depending on configuration selected)

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Purchase orders available for qualifying customers

# Network Output Stars For the Cost-Conscious

Network printers have just gone through a mini-renaissance. A couple of years ago, there had to be a dedicated print server to drive the shared printers on a network. Today's network printers connect to the network directly—as nodes. The result: They consume half the resources that dedicated-print-server configurations do. Network printers take up less space, and—here's the great news—they cost less. You can even get one capable of connecting to a variety of ports simultaneously, automatically sensing where signals are coming from (called *autosensing*).

All the printers we tested in this category were required to meet minimum specifications. We required 8-ppm output and 8MB to 12MB of RAM. We also demanded PCL 4+ compatibility and the ability to use NetWare 3.11/IPX/802.3 network protocols. PCL 5 and/or PostScript capabilities earned bonuses.

**Factors and Weights** Think these lower-end network printers are full of pitfalls? Nope. The big difference between this class of network printers and their 18-ppm siblings is speed. You're likely to find similar if not equivalent features in 8-ppm network printers and 18-ppm units.

We split the greater share of our evaluation's emphasis equally among the three most important network printer factors—output quality, performance, and price—with each of them accounting for 20 percent of the total score. The most telling characteristic of any printer's worth is output quality. While a printer may be nominally rated at one speed or another, the actual techniques employed to turn signals from the CPU into text and graphics will vary from vendor to vendor. These techniques vary in speed of execution, or performance, as well as in approach. Price rounded out the top three factors in our evaluation. Keep in mind that money you save by going with an 8-ppm printer can be reinvested in consumables and RAM.

Network features represent 15 percent of the total score. Service and support, at 10 percent, can be a big factor in getting any of these machines up and running. Good documentation, which represents 5 percent, is a plus. Ease of installation and maintenance—both at 5 percent of the final score—round out the results.

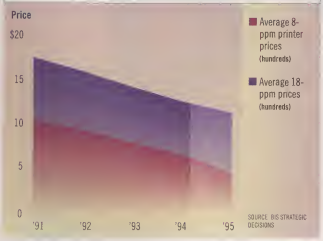
**How We Tested** To determine the performance ratings, ZD Labs printed documents from a series of business applications, reporting the average times based on four test printings of each document. The test pages included a WordPerfect 6.0a for DOS 10-page text document using printer-resident fonts; a Microsoft Word 6.0 for Windows 10-page text document using two non-resident TrueType fonts; a Microsoft PowerPoint 3.0 for Windows composite document made of graphics, text, and fills; and a CorelDraw 3.0 1-page, multielement document incorporating gray-ramp, gray-blend, and grayscale elements, plus hairlines and text.

Output quality was determined by a six-member jury which compared 2 pages from each printer: the first page of the 10-page Word document, and the 1-page CorelDraw document.

In scoring network features, we looked for NOS compatibility. To gauge ease of maintenance, we looked for coherent menu diagnostics, informative clues on printer status, ease of changing toner cartridges, and more. Ease-of-installation scores were based on how much time it took to get the printers running. In scoring service and support, we focused on warranties and availability of toll-free support. NATHAN GARCIA

## Market Trends: 8-ppm Network Printers

1. Most Prices to Drop This Year
2. No Dramatic Decline in 12-ppm Prices
3. Network Printers under $500 by 1995




**Output Rate Rules:** Print speed is still what you pay for in a laser printer. Even small workgroups can often make do with an 8-ppm printer. The number of users in your workgroup should equal page-per-minute print times.

## DECISION MAKER

HOW TO BUY THE BEST **8-PPM NETWORK PRINTER** FOR YOUR BUSINESS

**1** Choose the factor most important to you. **2** Choose the next most important factor. **3** What else is important? **4** For your needs, the best product to buy is . . .

| | | | |
|---|---|---|---|
| Output Quality | Performance | Service & Support | HP LaserJet 4M |
| | | Network Features | HP LaserJet 4M |
| | Price | Performance | Lexmark IBM 4039 10R |
| | | Ease of Maintenance | Lexmark IBM 4039 12R |
| Performance | Output Quality | Ease of Maintenance | HP LaserJet 4M |
| | | Ease of Installation | HP LaserJet 4M |
| | Network Features | Service & Support | QMS 860 Print System |
| | | Price | Lexmark IBM 4039 12R |
| Price | Ease of Installation | Ease of Maintenance | Lexmark IBM 4039 10R |
| | | Output Quality | NEC Silentwriter 1097 |
| | Service & Support | Performance | NEC Silentwriter 1097 |
| | | Output Quality | Lexmark IBM 4039 10R |

PC Best

### 8-ppm Network Printer

# HP LaserJet 4M

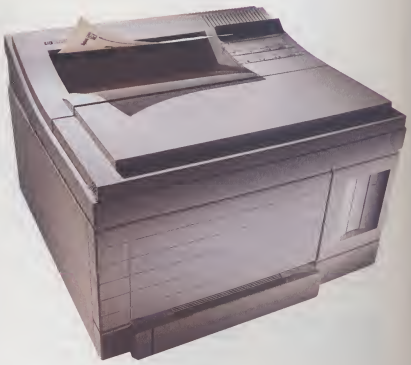
**OUTPUT QUALITY:** Hewlett-Packard's LaserJet 4M turned out crisp text and splashy graphics.

**PERFORMANCE:** Feel the need for speed? Say no more. If you want an 8-ppm network printer, here's the fastest.

**PRICE:** Hewlett-Packard's printers are rarely the cheapest—and at $2,399 the LaserJet 4M can't beat NEC's Silentwriter 1097 at affordability. But the LaserJet 4M is still a good value.

**NETWORK FEATURES:** We'd like to see Hewlett-Packard add TCP/IP compatibility, which gave the QMS printers a slight edge here.

**SERVICE AND SUPPORT:** We'd prefer toll-free, 24-hour support, but otherwise support policies are solid.



PHOTOGRAPH BY MARK JOHANN

**LaserJet 4M** / Hewlett-Packard / (800) 752-0900 / $2,399
*Circle Reader Service No. 736*

# Best 200 Printers

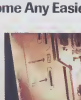
## 8-ppm Network Printers

| Rank | Product | Pros & Cons | Output Quality 20%* | Performance 20% | Price 20% | Network Features 15% | Service & Support 10% | Documentation 5% | Ease of Installation 5% | Ease of Maintenance 5% | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PC World Choice 1 | **LaserJet 4M** Hewlett-Packard (800) 752-0900 $2,399 *Reader Service No. 736* | **Pros:** Fast with text and graphics, crisp image quality impressed jury testers. **Cons:** No toll-free support. | 9.6 | 10 | 9.4 | 9.6 | 9.2 | 10 | 10 | 10 | **96.6** |
| 2 | **IBM LaserPrinter 4039 10R** Lexmark Int'l (800) 358-5835 $1,998 *Reader Service No. 737* | **Pros:** Consistent image quality in our jury tests. **Cons:** Middling speeds with some of our test files, although text printed quickly. | 9.6 | 8.8 | 9.7 | 9.6 | 9.2 | 9.6 | 10 | 9.2 | **94.4** |
| 3 | **IBM LaserPrinter 4039 12R** Lexmark Int'l (800) 358-5835 $2,248 *Reader Service No. 738* | **Pros:** Top-notch image quality got good reviews from jury testers. **Cons:** Mediocre speed in several of our performance tests. | 9.6 | 8.8 | 9.5 | 9.6 | 9.2 | 9.6 | 10 | 9.6 | **94.0** |
| 4 | **LaserWriter Pro 630** Apple (800) 776-2333 $2,139 *Reader Service No. 739* | **Pros:** Well-presented documentation, consistently crisp output, easy installation. **Cons:** No automated emulation switching. | 10 | 9.6 | 9.6 | 8.2 | 9.2 | 9.3 | 10 | 8.2 | **93.7** |
| 5 | **860 Print System** QMS (800) 523-2696 $4,595 *Reader Service No. 740* | **Pros:** Strong performance and straightforward installation. **Cons:** Organization of documentation could be improved. | 8.8 | 9.9 | 7.3 | 10 | 10 | 8.9 | 8.2 | 8.0 | **89.6** |
| 6 | **microLaser Pro 600 PS65** Texas Instruments (800) 527-3500 $1,998 *Reader Service No. 741* | **Pros:** Impressive speed no matter what we printed: Text or graphics, it was consistently fast. **Cons:** Lack of network flexibility and options compared to others. | 9.2 | 9.2 | 9.7 | 7.3 | 10 | 9.7 | 10 | 8.3 | **91.2** |
| 7 | **Silentwriter 1097** NEC (800) 632-4636 $1,500 *Reader Service No. 742* | **Pros:** Lowest price, strong performance. **Cons:** Documentation poorly presented, awkward installation cost us some time. | 8.2 | 9.8 | 10 | 7.8 | 9.2 | 7.2 | 7.1 | 9.0 | **88.6** |
| 8 | **860 Plus Print System** QMS (800) 523-2698 $5,999 *Reader Service No. 743* | **Pros:** Respectable speed in most of our tests, top-notch support and network features. **Cons:** Organization of documentation needs work, high price. | 8.6 | 9.1 | 7.0 | 10 | 10 | 8.9 | 8.2 | 8.0 | **87.0** |

*PERCENTAGES REFLECT THE WEIGHT OF EACH FACTOR IN TOTAL SCORE. FACTORS ARE SCORED ON A SCALE OF 1 TO 10. TOTAL SCORES ARE NORMALIZED TO A SCALE OF 1 TO 100. NOTEWORTHY SCORES ARE HIGHLIGHTED IN RED.

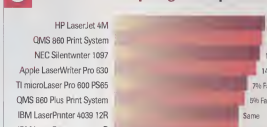
## Usability Close-Up
### Upgrades Don't Come Any Easier

The logic boards in **Lexmark's IBM LaserPrinter 4039 12R** are easy to access. The network card slot is accessible via a rear door—simple. Even better, the install program seeks out the server, and creates the print queue.



**In Your Face** The LaserPrinter's slots and cards are easily reached.

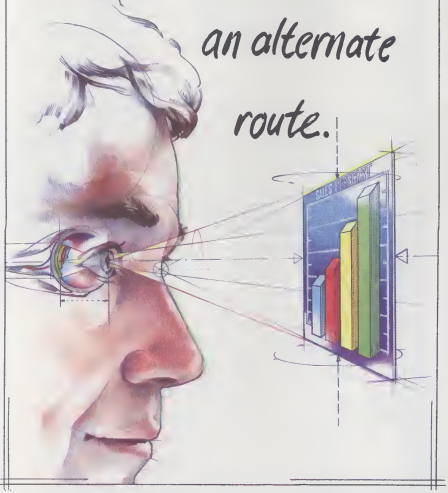
## Performance Spotlight: Output Rates




**Overall scores** for performance (above) are based on output speeds for several file formats.

PHOTOGRAPH BY ARNOLD TIGSELO

# You find that in important meetings, your points sometimes go in one ear and out the other? Maybe you should try an alternate route.



**It's not just presentation graphics, it's conversation graphics.** It's simple. If you've got a point to make in any face-to-face business situation, you can now make it in a more effective way with Freelance Graphics® for Windows.® It's so fast and easy, you can put together a powerful, graphic presentation any time you need to inform, influence, educate or persuade.

**One click does it all.** In Freelance Graphics, one click is all it takes to access some of the most powerful features in any presentation graphics software. One click, to choose from 108 data chart

*One-click access to all the tools you need makes Freelance Graphics the easiest presentation software available.*

styles, select from over 500 symbols, or browse galleries of organizational charts. You can take data and charts from your spreadsheet, combine them with elements such as text bullets and clip art, and give them a unified, polished look with one of over 100 SmartMaster design sets. You can take a 20-page marketing plan in your word processor, collapse it to an outline and instantly convert it to a multi-page presentation simply by bringing it into Freelance Graphics.

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# Double-Time Printers for Out-of-Time Workgroups

While it's true that laser printer prices are lower now than they've ever been—many of them under $1,000—it's still a budget-killer to put one on every user's desk. For a more cost-effective solution, consider a high-speed printer that can be attached directly to a network and shared by the whole department. The products we saw this year knocked us out.

Given that most workgroups have ten or more people sharing a single printer, we considered only printers with engine speeds around 18 pages per minute (ppm). We didn't specify a maximum price, but all the printers came in at $6,000 or under, making them excellent choices for the cost-conscious workgroup. Keep in mind that prices shown in the table on page 174 reflect the configurations we tested and may differ from manufacturers' list prices.

To qualify for our tests, each printer had to have between 8MB and 12MB of RAM, the amount we consider ideal for a network setting (although in some cases it may exceed the printer's standard configuration). Be wary of going with less RAM than this. Since network printers need to be versatile, they should offer both PCL and PostScript printing. However, we required only one or the other. Also, although we accepted printers that offer PCL 4 compatibility, we awarded extra points to those with PCL 5. This language is emerging as the preferred standard, and was found in most of the printers we tested. Finally, printers with automatic emulation switching were favored over those that lacked this feature.

**Factors and Weights** Although you should expect to pay more for one of these speed demons than for an ordinary standalone laser printer, price is still the critical factor in any printer buying decision. Accordingly, price accounts for 20 percent of each printer's total score. Equally important in a workgroup setting is performance, which also accounts for 20 percent. And, since high speeds and low prices are meaningless if printer output is illegible, output quality is weighted at 20 percent, too.

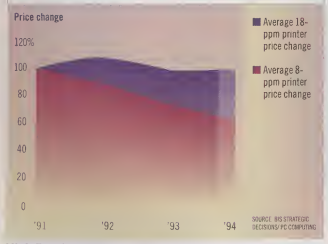
Network features such as emulation switching, multiprotocol support, simultaneously active ports, and internal network interface cards account for 15 percent of the final score. Service and support represent 10 percent of our total score, and we favored manufacturers that include on-site service and 24-hour support.

Installing a network printer can be tough, and can leave you with lingering questions. We assessed ease of installation and quality of the documentation. We also considered ease of maintenance. Each of these three factors accounts for 5 percent of the total score.

**How We Tested** Since it follows that the more people using a printer, the more varied the documents are likely to be, we printed a variety of text and graphic files to assess each printer's performance and output quality. More than any other class of printer, these network powerhouses must be able to print many kinds of files. We printed an array of graphics- and text-intensive files, including two text documents (a 10-page WordPerfect 6.0a for DOS file and a 10-page Microsoft Word 6.0 for Windows file), a 100-page Word file with a mixture of text and graphics, and a 3-page Microsoft PowerPoint 3.0 for Windows presentation, again with a mix of text and graphics. We also used a 1-page CorelDraw 3.0 document consisting of text, graphics, and grayscale images to judge graphics output quality. The first page of the 10-page Word document was used to score the text output quality. SHYAMALA REDDY

## Market Trends: 18-ppm Network Printers

1. Printer Prices Can Go Up: Look at 1991
2. Personal Printers Rarely Go Up in Price
3. Color Network Printer Prices Rise Often




**High End Stays Higher:** While personal printers (4 to 8 ppm) used to cost a third of the price of faster network printers, they're now about a fifth. The key to determining what's best for you? Calculate the per-user cost of the printer.

# Awesome monitor. Killer price.

| No monitor beats the 17" VisionMaster | | | | | |
|---|---|---|---|---|---|
| | VISIONMASTER MF-8617 | VIEWSONIC 17 | VIEWSONIC 17G | NEC 5FGE | NEC 5FGP |
| SCREEN SIZE | 17"FST | 17"FST | 17"FST | 17"FST | 17"FST |
| DOT PITCH | .26mm | .28mm | .28mm | .28mm | .28mm |
| MAX RESOLUTION | 1280 x 1024 | 1280 x 1024 | 1280 x 1024 | 1024x 768 | 1280 x 1024 |
| MAX REFRESH @ 1280 x 1024 | 80Hz | 76Hz | 60Hz | N/A | 76Hz |
| COLOR MATCHING | YES | YES | YES | NO | YES |
| POWER SAVING | YES | NO | YES | NO | YES |
| WARRANTY PARTS/LABOR | 3YRS/3YRS | 3YRS/1YR | 3YRS/1YR | 3YRS/3YRS | 3YRS/3YRS |
| EXTENDED WARRANTY | YES 2 YEARS | NO | NO | NO | NO |
| PRICE | $799 | $1199 | $999 | $1155 | $1455 |

VisionMaster 17" ONLY $799 MSRP

Three "plus" year warranty. 1280 x 1024 at 80 Hz. EnergyStar. Only VisionMaster packs $1,395 worth of performance into a $799 monitor.

This is a monitor to write home about. Every high-performance feature at an unheard of price—backed by the most aggressive warranty in the business. The new VisionMaster 17" FST.

3 YEAR WARRANTY

It's all here. Precision .26 dot pitch and incredibly fast 80 Hz vertical refresh for crystal clear, flicker-free images. Microprocessor control to eliminate image distortion. An anti-glare coating to relieve eye strain. A base three year warranty that can be extended to five years. MPR II low-radiation certification. And a unique "power-off" energy conservation system that makes any PC that uses it EnergyStar compliant.

Compare these features. Compare our "three plus" warranty. No monitor beats the 17" VisionMaster for value and performance. Call today—they'll be going fast.

For more information or the reseller nearest you, call today at 1-800-394-4335.

**VISIONMASTER™**

**IDEK Iiyama**

Iiyama North America, Inc.
650 Louis Drive, Warminster, PA 18974
Outside the U.S., call 215-957-6543
Fax: 215-957-6551

*Three year warranty on parts and labor when purchased through an authorized reseller
Windows is a registered trademark of Microsoft Corporation.
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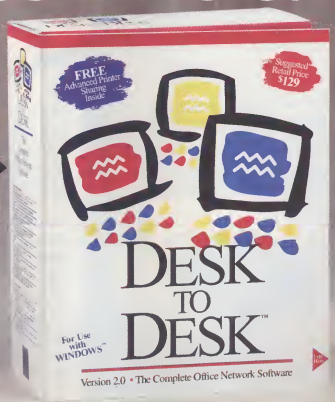
**Circle 179 on reader service card.**

# Go Ahead... Add Network Users. See If We Care!

**For:**
**Ethernet**
**Token Ring**
**ARCnet**




## 255-User Peer-to-Peer LAN. $129. Period.

| | DESK TO DESK | Windows™ for Workgroups | LANtastic™ |
|---|---|---|---|
| Price:* | | | |
| 2 User | $129 | $199.90 | $238 |
| 5 User | $129 | $399.95 | $595 |
| 20 User | $129 | $1,599.80 | $2,378 |
| 255 User | $129 | $20,397.45 | $2,999 |

*Prices are accurate at time of printing and are for comparative use only

DESK TO DESK™, the most powerful and easiest-to-use peer-to-peer LAN for business consumers, lets you network up to 255 users for a single price of $129. It's the only LAN that opens up your office, not your wallet.

Unlike other networks, with DESK TO DESK you never again pay to add PCs to your network as your small office, home office or corporate department grows. And with a full 30-day no-questions-asked money-back guarantee, you can't go wrong.

DESK TO DESK...all you expect in networking and more...for less.

| | DESK TO DESK | Windows™ for Workgroups | LANtastic™ |
|---|---|---|---|
| Windows or DOS? | Both | Windows only | Both |
| Disk Space Req'd | 89K - 3MB | 14.5MB | 2MB |
| Online Manual | Yes | No | No |
| Network-node Printer Control | Yes | No | Yes |
| Complete File Sharing | Yes | Yes | Yes |
| Password Security | Yes | Yes | Yes |
| CD-ROM Sharing | Yes | Yes | Yes |

## 800/835-DESK

Call today to order DESK TO DESK, or ask your local software retailer.

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DESK TO DESK™
The Complete Office Network™ Software

Circle 189 on reader service card.

## DECISION MAKER

HOW TO BUY THE BEST **18-PPM NETWORK PRINTER** FOR YOUR BUSINESS

**1** Choose the factor most important to you. **2** Choose the next most important factor. **3** What else is important? **4** For your needs, the best product to buy is . . .

| | | | |
|---|---|---|---|
| Output Quality | Performance | Service & Support | HP LaserJet 4Si MX |
| | | Network Features | HP LaserJet 4Si MX |
| | Price | Performance | Lexmark IBM 4039 16L |
| | | Ease of Maintenance | Lexmark IBM 4039 16L |
| Performance | Output Quality | Ease of Maintenance | HP LaserJet 4Si MX |
| | | Ease of Installation | HP LaserJet 4Si MX |
| | Network Features | Service & Support | QMS 1725 SLS |
| | | Price | HP LaserJet 4Si MX |
| Price | Ease of Installation | Ease of Maintenance | Lexmark IBM 4039 16L |
| | | Output Quality | Lexmark IBM 4039 16L |
| | Service & Support | Performance | HP LaserJet 4Si MX |
| | | Output Quality | Lexmark IBM 4039 16L |

PC Best

### 18-ppm Network Printer

## HP LaserJet 4Si MX

**OUTPUT QUALITY:** Look no further. Whether your workgroup prints text or graphics, the 4Si MX produces gorgeous hard copy.

**PERFORMANCE:** It outdid the rest of the pack. The closest competitor was more than 40 percent slower.

**PRICE:** Though at $5,499 it's far from cheap, the 4Si MX is no bank breaker.

**NETWORK FEATURES:** Simultaneously active parallel AppleTalk and Ethernet interfaces can automatically switch among ten network operating systems.

**SERVICE AND SUPPORT:** We'd like to see toll-free, 24-hour support, but Hewlett-Packard's 18-ppm printer support is solid.

**LaserJet 4Si MX** / Hewlett-Packard / (800) 752-0900 / $5,499
*Circle Reader Service No. 744*

PHOTOGRAPH BY MARK JOHANN

# Best 200 Printers

## 18-ppm Network Printers

| Rank | Product | Pros & Cons | Print Quality 20%* | Performance 20% | Price 20% | Network Features 15% | Service & Support 10% | Documentation 5% | Ease of Installation 5% | Ease of Maintenance 5% | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PC Best 1 | **LaserJet 4Si MX**<br>Hewlett-Packard<br>(800) 752-0900<br>$5,499<br>*Reader Service No. 744* | **Pros:** Great-looking text and graphics, much faster than the others, excellent, well-presented documentation.<br>**Cons:** Expensive compared to others in its class. | **10** | **10** | 8.3 | 9.1 | 9.6 | 10 | 10 | 9.5 | **94.6** |
| 2 | **IBM LaserPrinter 4039 16L**<br>Lexmark Int'l<br>(800) 358-5835<br>$3,698<br>*Reader Service No. 745* | **Pros:** Best price, our jury testers liked the output almost as much as Hewlett-Packard's LaserJet 4Si MX.<br>**Cons:** While some output times were fast, text printed slowly. | 9.8 | 7.8 | **10** | 9.1 | 9.3 | 10 | 10 | 9.0 | **92.7** |
| 3 | **QMS 1725 SLS**<br>QMS<br>(800) 523-2696<br>$5,999<br>*Reader Service No. 746* | **Pros:** Automatic emulation switching and PCL 5 got our attention, excellent service and support.<br>**Cons:** Most expensive, though not unreasonable for a workgroup printer. | 9.4 | 7.8 | 7.9 | 10 | 10 | 9.5 | 9.8 | 10 | **89.9** |
| 4 | **Dataproducts LZR 1580**<br>Dataproducts Corp.<br>(800) 980-0374<br>$4,595<br>*Reader Service No. 747* | **Pros:** 800-dpi engine; thorough, accessible documentation.<br>**Cons:** No PCL 5 support, manual language switching, difficult network installation compared to others. | 9.2 | 7.2 | 8.9 | 8.9 | 9.3 | 9.8 | 9.3 | 9.5 | **87.6** |
| 5 | **Dataproducts LZR 2080**<br>Dataproducts Corp.<br>(800) 980-0374<br>$5,495<br>*Reader Service No. 748* | **Pros:** 800-dpi engine; thorough, well-indexed documentation.<br>**Cons:** No PCL 5 support, manual language switching, difficult network installation relative to some others. | 8.9 | 7.3 | 8.3 | 8.9 | 9.3 | 9.8 | 9.3 | 9.5 | **86.0** |
| 6 | **PageLaser GX400**<br>Toshiba America<br>(800) 468-6744<br>$4,499<br>*Reader Service No. 749* | **Pros:** Reasonably priced.<br>**Cons:** 300-dpi engine, worst text and graphics quality, middling service and support, the documentation had some holes and could have been better presented. | 8.4 | 5.1 | 9.1 | 9.1 | 8.3 | 9.0 | 8.5 | 8.5 | **80.2** |

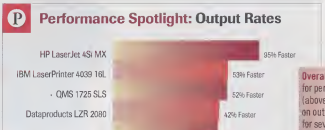
*PERCENTAGES REFLECT THE WEIGHT OF EACH FACTOR IN TOTAL SCORE. FACTORS ARE SCORED ON A SCALE OF 1 TO 10. TOTAL SCORES ARE NORMALIZED TO A SCALE OF 1 TO 100. NOTEWORTHY SCORES ARE HIGHLIGHTED IN RED

## Usability Close-Up
## Your Fingers Do the Walking

**QMS's 1725 SLS** control panel was designed with users in mind. The backlit LCD is clear, and easy-touch control buttons include in-key status lights. Other highlights: When a paper jam occurs, the status panel shows where the jam is.

**Punch It!** QMS's 1725 SLS takes feedback very seriously.

## Performance Spotlight: Output Rates




**Overall scores** for performance (above) are based on output speeds for several file formats.

PHOTOGRAPH BY ARNOLD TROSS JR

PHOTOGRAPH BY DAVID PERRY

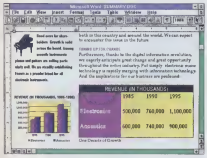
## KYLA CARLSON **HP DeskJet 1200C/PS**

I used to think I was like most business folks—I didn't really need a color printer. At least, that was until Hewlett-Packard's DeskJet 1200C/PS. Now I can't live without one. Not only do I use it for printing screen shots, charts, and documents that have been in the hands of three different editors and peppered with four colors of type, but oh, the fun I have! Printing in color is one thing; printing in tantalizing colors, on plain paper, for an extremely low cost per page—that's the ultimate experience. In addition to delivering fabulous color output (which I can spiff up with high-quality mode), the 1200C/PS can double as my text printer. While many color printers have problems printing high-quality black text, that's not the case with the 1200C/PS. It's a switch-hitter.

# A MILLION WORDPERFECT MICROSOFT WORD. MAKE

More and more people are coming aboard the most popular word processor for Windows.™ That's understandable. After all, Microsoft® Word is the world's best-selling word processor.

As well as the most acclaimed. *InfoWorld* recently stated, "We've found Microsoft Word 6.0 for Windows to be the best all-around word processing program available." *PC Magazine* added to this by calling it "...probably the most elegant and powerful word processor ever written."




*With just the click of a button, Word's custom toolbar lets you add graphics, make tables, and bring in data from other programs.*

We've also made switching to Word extremely convenient. As a million WordPerfect® users found out, Word not only converts their old files with the formatting intact, but allows you to type in familiar WordPerfect commands, while showing you the corresponding Word command. So you can learn as you work. All the time discovering features in Word that weren't available to you before.

Take our exclusive IntelliSense™ technology. Built-in intelligence that actually recognizes what you want to do and provides features that help you do it, in a lot less time. Simple tasks are automatic, more complex jobs are a snap.

Enter AutoCorrect. It can fix

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# USERS HAVE MOVED UP TO THAT A MILLION AND ONE.

your misspellings and common typos as fast as you make them.

Teh → The

And AutoFormat, which creates great-looking documents at the click of a button. Instantly.

Meanwhile, Word is a part of the Microsoft Office, where every program works together like one. So now it's even easier to share data between programs without leaving your document. It's simply our OfficeLinks integration that lets you focus on your work, not on finding your tools.

There's something else you get with Word that's becoming increasingly rare. Something that WordPerfect has walked away from: unlimited product support with no service charge.* Support so good that the Information Technology Association of America has awarded Microsoft their 1993 award for quality. (For WordPerfect users there's a phone number to make switching even easier.)

To make the move to Word more inviting, you can now upgrade for only $99.** For a reseller near you, call (800) 894-6642, Dept. JCU. And you'll see why so many former WordPerfect users have set a new course with Word.

Microsoft Office

*$30 rebate off $129 Upgrade SRP. Reseller prices may vary. Licensed users of WordPerfect, other competitive word processors, and previous versions of Microsoft Word qualify for $129 SRP and for rebate upon acquiring Microsoft Word 6.0. Word the Microsoft Access® database management system, and a Mac workstation license (server and software must be acquired separately). In the 50 United States, call (800) 894-6642, Dept. JCU. For information only: In Canada, call (800) 563-9048; in Canada. Quotes used by permission. Reprinted from *InfoWorld*, February 7, 1994. © 1994 International Data Group. Reprinted from *PC Magazine*, February 8, 1994. © 1994 Ziff-Davis Publishing Company L.P. © 1994 Microsoft Corporation. All

Best 200

Dazzling Colors, Crisp Text, Panoramic Views . . .

# Video

**SYNOPSIS**


**VIDEO CARDS:** *We found the fastest times ever in Windows app tests.* **180**

**17-INCH MONITORS:** *Two displays impressed our jury testers. One won.* **188**

**20- AND 21-INCH MONITORS:** *From image quality to color, our jury told it like it was.* **192**

**EDITOR'S CHOICE:** *Space-age digital controls on a staff-favorite big display put precision at your fingertips.* **197**


E=mc²? Forget it. Here's one of the most powerful equations on the desktop: More pixels = greater productivity. When it comes to displays, even a few inches can make a huge difference. Upgrade from a 14-inch monitor to a 17-inch model, and you can easily bump the pixel resolution from 640 by 480 to 800 by 600.

That's nearly 60 percent more onscreen real estate without eyestrain—meaning more numbers in your spreadsheets, more words in your documents, more applications running side by side.

At the same time, matching a big monitor with the right video adapter demands perfect chemistry. That's why we tested a slew of top video cards along with our 17-inch and 20- to 21-inch displays.

Step up to a 21-inch monitor and previously inscrutable images come clear. At 1,280-by-1,024-pixel resolution, you have a whopping million pixels to work with.

Despite their bulk, the latest big monitors are graceful and power efficient. As always, the so-called flat-square designs, dominated by NEC Technologies and Nanao USA, compete with Sony's Trinitron technology. Mitsubishi, on the other hand, has incorporated Trinitron technology into its 21-inch Diamond Pro 21T, and the result is impressive.

Once you've decided between Trinitron and flat-square technologies, the refresh rate is crucial—plenty of monitors claim to deliver 1,280-by-1,024 resolution, but few actually support the 72-Hz (or higher) refresh rate that your eyes need. Microprocessor-based image controls are also a usability must.

Video-board makers have paid attention to usability, too: Number Nine Computer was first to offer software utilities that let you fine-tune resolution; now everyone does.

When it comes down to it, the story is silicon. The hot new Windows accelerators are 64-bit designs that have migrated from workstations to the desktop in fast boards like Matrox Technologies' MGA Ultima. ATI Technologies has added accelerators for full-motion video to its chips, and rivals like Weitek are only steps behind. And today's hot video cards ride the local bus—VL-Bus on 486s and PCI on Pentiums. The payoff? On the desktop, video is better than ever. ED BOTT

**A BIG-TIME WINDOWS:** Load up the software for **Mitsubishi's Diamond Pro 21T** 21-inch monitor, attach the serial cable, and you get convenient onscreen controls for the monitor.

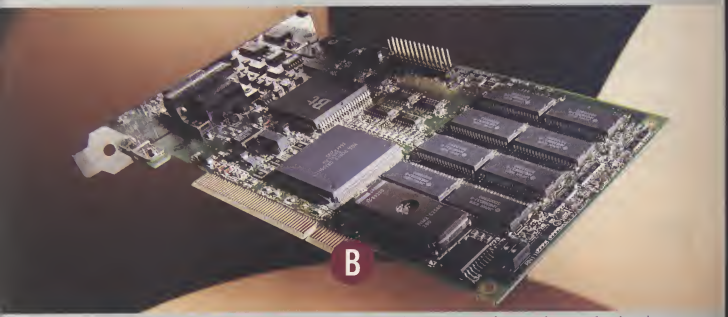
**B ROCKET CHIP:** The 64-bit graphics chip smack in the center of **Matrox's MGA Ultima** video card, plus its 64-bit data path, help deliver smooth multimedia performance.

**C POWER IN CHECK:** Because monitors are on throughout the day (and sometimes beyond), look for a power-management switch like the one on **Nanao's FlexScan F560iW** 17-incher.

PHOTOGRAPHS BY MARK JOHANN

A

What's new in the world of video? Control has become the order of the day.



B

From intelligent software to smart video cards to control panels, you're in charge.

C

# Picture-Perfect Windows? The Res Is All in the Cards

How do you break the Windows speed limit? With an ultrafast graphics card, of course. High-resolution local-bus graphics cards push Windows performance to new limits. Not only are the graphics processing chips on this new breed of accelerators faster than ever, their higher resolutions (1,024 by 768 pixels and higher) are ideal for displaying multiple applications in Windows on large-screen monitors.

All of this graphics power costs less than you might expect, too: Prices for the boards we tested fell in the $250 to $600 range. That's dramatically less than the $350 to $1,795 you would have paid last year.

To qualify for *PC Computing*'s Best 200, boards in this category had to support at least 1,024-by-768-pixel resolution in noninterlaced mode at 72Hz or higher refresh rates. Boards that could display resolutions and refresh rates beyond this standard garnered extra points. Additionally, cards had to display at least 256 colors at this resolution, but many support 16.7 million colors (24-bit) at this resolution as well. Many boards also sync up to 1,280-by-1,024-pixel resolution, and all support 800-by-600 and 640-by-480-pixel resolutions. We required at least 2MB of memory onboard; STB Systems' LightSpeed VL had 4MB.

All of the boards we considered also had to support the PCI or VL-Bus local-bus standard. Most 486- and Pentium-class PCs now ship with either PCI or VL-Bus onboard, which is all but required for the most demanding graphics tasks. This is also the first year that local-bus graphics cards have outsold plain-vanilla ISA models. Most boards tested come in both PCI and VL-Bus versions; we asked manufacturers to provide their fastest models.

**Factors and Weights** Speed is a primary concern with cards in this category, so we rate performance as 35 percent of a product's total score, taking into consideration how well a board handled text and graphics under Windows and (to a lesser extent) under DOS. Price, though less of a priority than performance, makes up 20 percent of a board's score. Prices are for configurations we tested.

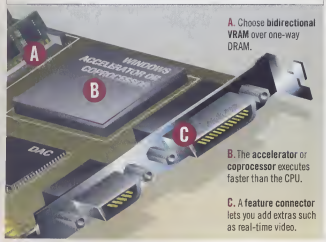
The more resolutions and colors a video card is able to support, the more flexibility and compatibility it offers. For this reason, video signals supported accounts for 15 percent of our total scores. We awarded extra points to cards that offer more than 256 colors at various resolutions, and those that have refresh rates of 72Hz and higher at all resolutions.

When evaluating service and support—10 percent of final scores—we considered whether driver updates were available from the company via mail or a BBS. Companies with toll-free support lines and long warranties merit extra points. Another 10 percent of a board's score is derived from ease of installation. Boards that are configured through software, instead of jumpers and hardware dip switches, fare better than those that aren't. Documentation makes up 10 percent of a card's score and takes into consideration thoroughness, organization, and accuracy.

**How We Tested** ZD Labs ran the cards through a series of Windows performance tests. All boards were tested at 1,024-by-768-pixel resolution at 256 colors. ZD Labs evaluated the cards' ability to handle different resolutions to ensure compatibility with different video signals. All boards were tested on similarly configured 60MHz PCI and VL-Bus Pentium systems. Competition was tight: Our top three boards' total scores were separated by only about a point. WENDY TAYLOR

## Technical Checkpoints: Video Cards

1. 24-bit Color
2. Support for Either VL-Bus or PCI-Bus
3. Support for Your Monitor Resolution




**Take the Express Bus:** As a rule, high-speed PCs now ship with either VL-Bus or PCI local bus, which rev up demanding Windows-based graphics tasks. Most of the boards we tested come in both versions.

## DECISION MAKER

HOW TO BUY THE BEST **VIDEO CARD** FOR YOUR BUSINESS

| 1 Choose the factor most important to you. | 2 Choose the next most important factor. | 3 What else is important? | 4 For your needs, the best product to buy is . . . |
|---|---|---|---|
| Performance | Price | Video Signals | Diamond Stealth 32 |
| | | Ease of Installation | Media Vision Pro Graphics |
| | Video Signals | Service & Support | Media Vision Pro Graphics |
| | | Ease of Installation | Number Nine #9GXE64 |
| Price | Service & Support | Performance | Diamond Stealth 32 |
| | | Ease of Installation | Number Nine #9GXE64 |
| | Performance | Service & Support | Diamond Stealth 32 |
| | | Documentation | Number Nine #9GXE64 |
| Video Signals | Price | Service & Support | Diamond Stealth 32 |
| | | Ease of Installation | Number Nine #9GXE64 |
| | Service | Performance | Media Vision Pro Graphics |
| | | Ease of Installation | Number Nine #9GXE64 |

PC Best

### High-Performance Video Card

## Media Vision Pro Graphics

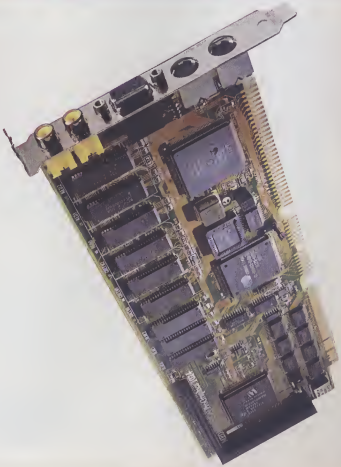
**PERFORMANCE:** Powered by Media Vision's own MVV452 accelerator chip, the Pro Graphics 1024 running Windows apps clocked some of the fastest scores we've seen.

**PRICE:** Photorealistic images in 24-bit color for a reasonable $449.

**VIDEO SIGNALS:** The Pro Graphics 1024 does splashy 24-bit color at 1,024-by-768-pixel resolution—true of only the best video cards.

**DOCUMENTATION:** It doesn't get any more thorough than this—although the presentation isn't perfect.

**EASE OF INSTALLATION:** For both Windows and DOS, there's a straightforward, step-by-step installation utility.



**Pro Graphics 1024** / Media Vision / (800) 845-5870 / (510) 770-8600 / $449
*Circle No. 751 on Reader Service Card*

PHOTOGRAPH BY MARK JOHANN

# Best 200 Video

## Video Cards

| Rank | Product | Pros & Cons | Performance 35%* | Price 20% | Video Signals 15% | Documentation 10% | Ease of Installation 10% | Service & Support 10% | Total Score |
|---|---|---|---|---|---|---|---|---|---|
| PC Best 1 | **Pro Graphics 1024** (VL-Bus) Media Vision (800) 845-5870 $449 *Reader Service No. 751* | **Pros:** Lightning-fast performance, 24-bit color at 1,024-by-768-pixel resolution, simple installation routine, outstanding support. **Cons:** No support for 1,280-by-1,024-pixel resolution. | 10 | 9.4 | 9.6 | 9.7 | 9.6 | 10 | 97.5 |
| 2 | **#9GXE64** (PCI) Number Nine Computer (800) 436-6463 $349 *Reader Service No. 752* | **Pros:** Outstanding software utilities, plug-and-play installation, best documentation of the bunch. **Cons:** Several other boards edged it out in Windows performance. | 9.5 | 9.7 | 10 | 10 | 10 | 9.7 | 97.4 |
| 3 | **Stealth 32** (PCI) Diamond Computer Systems (408) 736-2000 $269 *Reader Service No. 753* | **Pros:** Unbeatable price, first-rate Windows and DOS performance. **Cons:** Installation may require setting jumpers. We didn't run into major problems during install, but some other boards were easier to set up. | 10 | 10 | 9.3 | 9.2 | 8.9 | 9.7 | 96.8 |
| 4 | **MGA Ultima** (PCI) Matrox (800) 361-1408 $599 *Reader Service No. 754* | **Pros:** Superb Windows performance, on par with the Pro Graphics 1024. **Cons:** Pricey. Installation can be difficult—though it wasn't as time-consuming as some of the others. | 10 | 8.9 | 8.9 | 9.2 | 8.5 | 9.7 | 93.6 |
| 5 | **Dynamite Power VL** (VL-Bus) Hercules Computer Technology (800) 532-0600 $339 *Reader Service No. 755* | **Pros:** Fast and affordable, good price/performance balance. **Cons:** Installation may be tricky for novices. We spent more time than usual setting up this one, and didn't get much help from the documentation. | 9.7 | 9.7 | 9.3 | 9.2 | 7.3 | 9.7 | 93.5 |
| 6 | **LightSpeed VL** (VL-Bus) STB Systems (800) 234-4334 $289 *Reader Service No. 756* | **Pros:** Solid Windows and DOS performance—though it was edged out by a few other boards. One of the least expensive boards in its class. **Cons:** Installation may require setting jumpers. | 9.4 | 9.9 | 8.9 | 8.7 | 8.5 | 8.7 | 92.0 |

*PERCENTAGES REFLECT THE WEIGHT OF EACH FACTOR IN TOTAL SCORE. FACTORS ARE SCORED ON A SCALE OF 1 TO 10. TOTAL SCORES ARE NORMALIZED TO A SCALE OF 1 TO 100. NOTEWORTHY SCORES ARE HIGHLIGHTED IN RED

*(table continued on page184)*

### Usability Close-Up
### Plug and Play

Video cards are notoriously cantankerous beasts to install. They make changing a tire look like child's play. In fact, some of the boards we tested called for complicated jumper settings and other headaches. That's why **Number Nine's #9GXE64** plug-and-play installation is such a welcome exception to the video-card setup rule. Just pop the half-length board in your PC, run the software installation routine, and the #9GXE64's crafty installation utility takes care of the rest. The utility is completely friendly. There are no dip switches to fiddle with, no hardware jumpers to move. We give it a hearty thumbs up, and wish more boards took this automatic approach.

**Easy Does It** The #9GXE64 is as clean as boards get—no annoying jumpers and switches.

PHOTOGRAPH BY ARNOLD TOSKJO

# Announcing the latest breakthrough in high-performance notebook computers – the TravelMate™ 4000E WinDX4™/75.

**The new TI TravelMate 4000E WinDX4/75MHz notebook. With its IntelDX4 processor, you have the power to be more productive.**

At Texas Instruments, we've listened to your needs. That's why we've created a way for you to work faster and increase your productivity — with the new TravelMate WinDX4/75 active matrix color notebook computers.

You'll find a lightning-fast 75MHz IntelDX4 processor inside. Combined with our innovative system architecture, your new TravelMate will scream with speed. And with 3 to 5 hours of battery life and a 455MB hard drive, you can be more productive even when you're on the go.

Finally, with so many high-performance features packed in, who needs a desktop PC? The TravelMate 4000E WinDX4/75 does it all. To learn where you can reserve yours today, simply call **1-800-TI-TEXAS** (1-800-848-3927), after all, they're going fast.

**TRAVELMATE 4000E SERIES NOTEBOOKS**

| DISPLAY | PROCESSOR | MEMORY† |
|---|---|---|
| Active Matrix Color (9.5") | IntelDX4-75MHz | 4MB RAM/455MB HDD |
| Active Matrix Color | IntelDX4-75MHz | 4MB RAM/340MB HDD |
| Active Matrix Color | 486DX2-50MHz | 4MB RAM/200MB HDD |
| Dual Scan Color | 486DX2-50MHz | 4MB RAM/200MB HDD |
| Color | 486DX2-40MHz | 4MB RAM/200MB HDD |
| Color | 486SX-25MHz | 4MB RAM/120MB HDD |
| Monochrome | 486DX2-50MHz | 4MB RAM/200MB HDD |
| Monochrome | 486SX-25MHz | 4MB RAM/120MB HDD |

**TRAVELMATE INTELLIGENT DOCKING SYSTEM**

| COMPATIBILITY | EXPANSION | INTERFACES |
|---|---|---|
| TI TM4000E Series Notebooks | Six 16-bit ISA slots, two PCMCIA Type II slots, four drive bays | Parallel/2 Serial, VGA, Mouse, keyboard, game port and RJ-11 jack |

† RAM expandable to 20MB with optional memory

"TravelMate WinDX4 and "Extending Your Reach With Innovation" are trademarks of Texas Instruments. Intel DX4 is a trademark and the Intel Inside logo is a registered trademark of Intel Corp. © 1994 TI.

EXTENDING YOUR REACH WITH INNOVATION™

TEXAS INSTRUMENTS

Circle 155 on reader service card.

## Video Cards *(continued)*

| Rank | Product | Pros & Cons | Performance 35%* | Pros 20% | Video Signals 15% | Documentation 10% | Ease of Installation 10% | Service & Support 10% | Total Score |
|---|---|---|---|---|---|---|---|---|---|
| 7 | **Graphics Ultra Pro** (PCI and VL-Bus) ATI Technologies (905) 882-2600 $499 *Reader Service No. 757* | **Pros:** Well-supported and well-rounded. It wasn't a runaway winner in any category, but didn't fall down in any significant way. Installation was easier than other boards. **Cons:** It was fast, but most of the competition was faster. | 8.7 | 9.2 | 9.8 | 9.2 | 9.4 | 9.5 | 91.7 |
| 8 | **Dynamite Pro VL** (VL-Bus) Hercules Computer Technology (800) 532-0600 $299 *Reader Service No. 758* | **Pros:** Good price/performance value, support for both Hercules boards is constantly available. **Cons:** Installation may be a challenge for novices. Does not support 1,280 by 1,024 noninterlaced resolution. | 8.9 | 9.9 | 9.3 | 9.0 | 7.3 | 9.7 | 90.9 |
| 9 | **Phantom 32i Model 8900PCI** (PCI) Genoa Systems (800) 934-3662 $325 *Reader Service No. 759* | **Pros:** Fast and affordable. Performance scores were consistent. **Cons:** No-frills documentation had some holes and wasn't as well-presented as it should have been. Skimpy installation software. | 9.1 | 9.8 | 8.9 | 8.9 | 8.5 | 8.2 | 90.4 |
| 10 | **Viper** (PCI) Diamond Computer Systems (408) 736-2000 $499 *Reader Service No. 760* | **Pros:** VRAM memory means performance doesn't drop off as you add more colors. Good support policies and support availability. **Cons:** Installation was complex. Novices can count on some setup headaches. | 9.0 | 9.2 | 8.4 | 9.2 | 7.3 | 9.7 | 88.7 |
| 11 | **GraphicsEngine 64** (PCI) Actix Systems (800) 927-5557 $299 *Reader Service No. 761* | **Pros:** Impressive in performance tests. **Cons:** Windows driver utility was cantankerous. Installation was difficult. We ran into more significant problems during setup with this board than with any of the others. | 9.6 | 9.9 | 7.0 | 8.9 | 6.1 | 8.7 | 87.6 |

*PERCENTAGES REFLECT THE WEIGHT OF EACH FACTOR IN TOTAL SCORE. FACTORS ARE SCORED ON A SCALE OF 1 TO 10. TOTAL SCORES ARE NORMALIZED TO A SCALE OF 1 TO 100.

### Performance Spotlight: Windows Applications

**Overall scores** for performance (above) are based on Windows tests and DOS tests.

NOTE: TESTS MEASURED PERFORMANCE WITH STANDARD WINDOWS APPLICATIONS

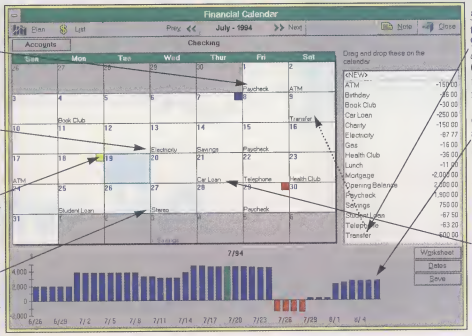
# How can you organize all your finances without entering all your financial data?

**1. Just put your bills and paydays on Quicken's Financial Calendar* one time.** No need to enter all the same checks and deposits month after month.

**2. Your electric bill is higher than usual?** Quicken asks if the amount is different, and you change it in seconds. Simple!

**3. Isn't it someone's birthday today?** Calendar Notes remind you of important events in your busy schedule.

**4. You bought a new stereo today.** Simply note this one-time purchase on your calendar. Quicken makes everything easy.




**5. You usually make a transfer to savings on the 9th.** Well, now you *always* make that transfer. Once you drag and drop it to the calendar, Quicken remembers and reminds you.

**6. Can you really afford a new car?** This graph projects your future account balances. Play "what if...?" with the down and monthly payments, and see how things look.

**7. You decide to buy the car.** (Congratulations!) Quicken notes who you pay, how much, when and for how many months – and asks the loan rate, so it can calculate your spending on interest and principal.

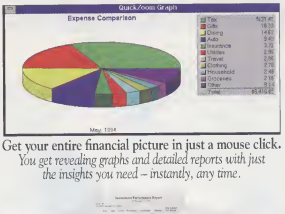
# Just fill yourself in on Quicken.

Now you know exactly where your money goes and exactly how much you have – without entering all the same checks and deposits over and over, month after month.

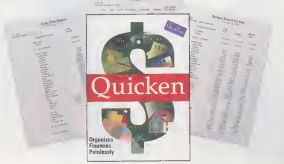
Just put your regular bills and deposits on Quicken's Financial Calendar, and from now on Quicken automatically tracks and projects your account balances. What's more, it puts each item in an income or expense category, so a mouse click shows you things you never realized about you and your money.

You find out everything from how much you're spending on lunches, clothing and interest to how much you're making on a mutual fund. You discover exactly what it will take to reach your savings and investment goals. You can even see how your small business is doing.

Quicken makes organizing all your finances – bank accounts, loans, credit cards, investments – as easy as filling in a familiar form.




**Get your entire financial picture in just a mouse click.**
*You get revealing graphs and detailed reports with just the insights you need – instantly, any time.*




*Available for DOS, Windows and Macintosh. (Macintosh does not include the Financial Calendar.)*

It's so fast, you can reconcile your bank statement – to the penny – in two minutes. And it doesn't even take discipline, because you use it when you're sitting down to pay the bills anyway.

Fill yourself in today on what looks like a calendar, but is positively the best thing to happen to organizing your finances in years.

**Try Quicken for just ~~$69.95~~!**
*Now only $49.95!**
Plus $5.00 shipping and handling (international shipping extra)
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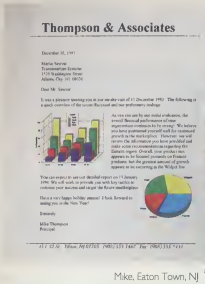
24 hours a day, 7 days a week U.S. and Canada
**No-risk, 60-day money-back guarantee**
Expires 8/31/94 Ad Code PM6YO

*Introducing Quicken for Windows CD-ROM Deluxe Edition.
Now only ~~$79.95~~ $69.95

PM6YO



**Thompson & Associates**

December 30, 1997

Marcia Sawyer
Marketing Director
1135 Washington Street
Atlanta, City, GA 08030

Dear Ms. Sawyer

It was a pleasure meeting you at our on-site visit of 11 December 1992. The following is a quick overview of the scores discussed and our preliminary findings.



As you can see by our initial evaluation, the overall financial performance of your organization continues to be very strong. We believe you have a very solid foundation for future growth and increased profits. However, our initial review, the information you have provided and our exit interview indicate that your organization appears to be focused primarily on Product/Service issues. Unfortunately, this focus appears to be focused primarily on Product/ product but the greatest amount of growth appears to be occurring in the Widget Inc.

You can expect to see our detailed report on 15 January 1998. We will work to provide you with key tactics to continue your success and target the future marketplace.

Have a very happy holiday season! I look forward to seeing you on the New Year!

Sincerely,

Mike Thompson
Principal

*411 S.E. Sir Tabor, NJ 07765 (908) 555 1682 Fax (908) 555 1212*

Mike, Eaton Town, NJ

*Kusak Enterprises, Inc.*
1700 Clover Way, Seattle, WA 98103

Paul Cooper
President
Cooper & Christensen
934 Lincoln St
Seattle, WA 98102

December 10, 1993

Dear Paul,

Thank you for attending our recent seminar in our area. I have enclosed the following information we discussed.

- A transcript of the seminars and proceedings
- A brochure detailing our background and qualifications

Please review the information and have any who could not attend call Pulaski High School's Cooper Initiative. In many cases the Tele-media Automated School on eastern US/NS website link be best.

Building wide spread support for this type of system is critical to its success. Parent involvement is fundamental. It is important to expose teachers and parents to the ASS in the early stages of your endeavors to ensure the application will be successful. I would be glad to present another brief overview to your staff, or a more comprehensive session for teachers, PTA, parents and any local businesses interested in sponsoring an ASS.

Thank you again for our interest and participation on our seminar. If you have any questions or comments please feel free to contact me at (206) 555 1234. I look forward to working together to bring this truly worthwhile service to the community.

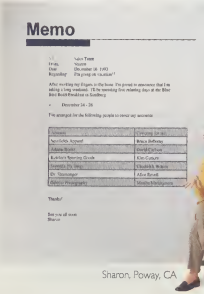
Sincerely

Lisa

| Comments | Yes | No |
|---|---|---|
| Teachers | ✓ | |
| Parents | | ✓ |
| Students | ✓ | |
| Administrator | ✓ | |
| Volunteers | | ✓ |
| Sponsors | ✓ | |

Lisa, New York, NY

# All we ga
# was 30 minutes.
# first docume



**Memo**

To: Sales Team
From: Naomi
Date: December 28, 1992
Regarding: The group on vacation!

After working for Hogan, is the best. I'm proud to announce that I'm taking a long weekend. I'll be returning this relaxing days at the Blue Bird Bread Breakfast in Lindberg.

- December 24 - 28

I've arranged for the following people to cover my accounts:

| Accounts | Covering Agent |
|---|---|
| Apex Sales Apparel | Maria Delfeny |
| Adams Realty | David Gordon |
| Kathleen Sporting Goods | Kim Carlyle |
| Dynamic Dry Goods | Elizabeth Morris |
| Dr. Thompson | Alex Revell |
| Exterior Photography | Martin Mulchjanson |

Thanks!

See you all soon
Naomi

Sharon, Poway, CA

**ECONEWS**

Issue 1 — Spring 1992

**Organization Summary**

Management Summary
Management consists of individual who have at least 5 years of Management experience as well as a strong background in the hospitality industry, food operations, and station managers, backtracks to these areas are required. Management will assist volunteers, management, students and planning or supervising in construction of a wetland restoration. There

**EcoService**



Dan, Buffalo, NY

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isual communication. It makes documents much more effective. But it doesn't have to make them harder to create.

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# See What You're Missing: Demand a Panoramic View

You can buy a system with a faster processor to make yourself more efficient in Windows, but here's a better idea: Move up to a larger monitor. When it comes to getting the most out of Windows, a 17-inch (or larger) high-resolution monitor is guaranteed to boost your productivity. The added desktop space of a 17-inch monitor lets you squeeze nearly 50 percent more information onscreen than you can with a 14-inch VGA display, allowing you to have several application windows active at once. The difference is noticeable. Not surprisingly, 17-inch monitors work well for single-page desktop publishing tasks.

To qualify for this year's *PC Computing* Best 200, 17-inch displays had to be able to handle resolutions of 1,280 by 1,024 pixels at refresh rates of 72Hz or higher. We also required the monitors to include microprocessor-based digital controls for storing image settings in memory. This is quickly becoming a standard.

All of the displays we considered have a 0.28mm or smaller dot pitch to guarantee the tightest focus possible. And, they all use flat-square or Trinitron-style glass tubes, which cut glare and minimize image distortion. Finally, all of the monitors employ some form of software or hardware power management, and all support the Swedish MPR II low emissions (low radiation) standard.

**Factors and Weights** The larger the display, the more important image quality becomes because any flaws in the image are magnified. Image quality, therefore, is 30 percent of a monitor's total score, taking into account focus, contrast, brightness, and ability to display fine lines and small type sizes without losing detail. A related factor, color quality, accounts for 20 percent of a monitor's score and takes into consideration a juried panel's evaluation of color quality and color convergence. The jury evaluated monitors side by side. Also important is price, which amounts to 20 percent of a product's score.

The video signals supported account for 10 percent of a total score and measure how well a monitor handles different video modes (shelling out to DOS from Windows, for example), the number of video-image settings it stores in memory, as well as vertical and horizontal refresh rates and bandwidth. These are the factors that affect a monitor's ability to work with a range of display adapters. In evaluating construction, 10 percent of the score, we considered the monitor's controls, active display area, glare, overall construction quality, amount of energy used, and other design elements.

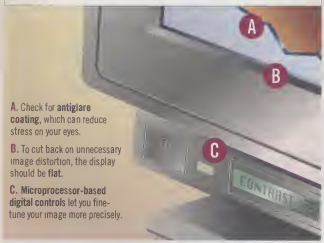
Service and support merits 5 percent and takes into account the length of a display's warranty and whether it covers both parts and labor. Because sophisticated controls often require explanation, we also gave 5 percent to documentation.

**How We Tested** We asked ZD Labs to subject the monitors to a battery of image-quality and resolution tests. The Labs' staff tested focus, distortion, glare, overall image geometry (whether circles appear round or oval, for example), and color saturation. They also tested how well the displays handled different video resolutions. All 17-inch monitors were tested on 33MHz 486 systems using Graphics Ultra Pro video adapters from ATI Technologies.

For the subjective testing of the monitors, a panel of six jurors evaluated overall focus, color quality, contrast, brightness, controls, ergonomics, and design. The competition was neck and neck. WENDY TAYLOR

## Technical Checkpoints: 17-inch Monitors

1. EPA and VESA Standards Compliance
2. MPR II Emission Standard Compliance
3. Minimum 72Hz Refresh Rates




**A.** Check for **antiglare coating**, which can reduce stress on your eyes.

**B.** To cut back on unnecessary image distortion, the display should be **flat**.

**C.** **Microprocessor-based digital controls** let you fine-tune your image more precisely.

**Easy on the Eyes and More:** The EPA sets energy consumption standards, while Sweden's MPR II standard mandates low radiation. The VESA group sets compatibility and performance management guidelines.

## DECISION MAKER

HOW TO BUY THE BEST **17-INCH MONITOR** FOR YOUR BUSINESS

**1** Choose the factor most important to you. **2** Choose the next most important factor. **3** What else is important? **4** For your needs, the best product to buy is . . .

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| Image Quality | Color Quality | Video Signals | Nanao FlexScan T560i |
| | | Construction | Nanao FlexScan T560i |
| | Construction | Price | NEC MultiSync 5FGp |
| | | Video Signals | Nanao FlexScan T560i |
| Price | Image Quality | Color Quality | ViewSonic 17G |
| | | Video Signals | NEC MultiSync 5FGp |
| | Construction | Video Signals | NEC MultiSync 5FGp |
| | | Service & Support | NEC MultiSync 5FGp |
| Video Signals | Image Quality | Construction | Nanao FlexScan T560i |
| | | Color Quality | Sony Multiscan 17se |
| | Price | Color Quality | NEC MultiSync 5FGp |
| | | Service & Support | NEC MultiSync 5FGp |

PC Best

### 17-inch Monitor

## NEC MultiSync 5FGp

**IMAGE QUALITY:** Jurors loved the MultiSync 5FGp's sharp, focused image. Only Nanao's FlexScan T560i rated ever-so-slightly higher.

**COLOR QUALITY:** Bright, brilliant images dazzled our jury testers. We want these colors.

**PRICE:** It's not the cheapest, but prices don't get too much lower than $1,175.

**VIDEO SIGNALS:** The MultiSync 5FGp syncs to 76Hz, and switches smoothly between resolutions.

**CONSTRUCTION:** The design stood out. Note, however, that the flap in front of the microprocessor controls is flimsy and prone to breaking.

**MultiSync 5FGp** / NEC Technologies / (800) 388-8888 / (508) 264-8000 / $1,175
*Circle No. 762 on Reader Service Card*

PHOTOGRAPH BY MARK JOHANN

# Best 200 Video

## 17-inch Monitors

| Rank | Product | Pros & Cons | Image Quality 30% | Color Quality 20% | Price 20% | Video Signals 10% | Construction 10% | Documentation 5% | Service & Support 5% | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|
| PC Best 1 | **MultiSync 5FGp**<br>NEC Technologies<br>(800) 388-8888<br>$1,175<br>*Reader Service No. 762* | **Pros:** Outstanding image quality, excellent price. The jury liked it.<br>**Cons:** Control cover isn't as solid as it should be and is prone to breaking. | 9.8 | 9.9 | 9.5 | 9.5 | 9.8 | 10 | 10 | **97.5** |
| 2 | **FlexScan T560i**<br>Nanao USA Corp.<br>(800) 800-5202<br>$1,899<br>*Reader Service No. 763* | **Pros:** Trinitron tube delivers razor-sharp text, image quality can't be beat.<br>**Cons:** The price is still steep, despite recent reductions. | 10 | 10 | 8.6 | 9.8 | 10 | 9.8 | 10 | **96.9** |
| 3 | **ViewSonic 17G**<br>ViewSonic Corp.<br>(800) 888-8583<br>$999<br>*Reader Service No. 764* | **Pros:** Strong all-around performer, low price.<br>**Cons:** Tilt-and-swivel base and control panel could be sturdier. Documentation had a few holes. | 9.3 | 9.3 | 9.8 | 9.5 | 8.9 | 8.9 | 9.5 | **93.7** |
| 4 | **Multiscan 17se**<br>Sony Electronics<br>(800) 352-7669<br>$1,499.95<br>*Reader Service No. 765* | **Pros:** Excellent color quality, rich colors wowed jury testers.<br>**Cons:** Our testers wanted tighter focus. | 8.9 | 9.9 | 9.0 | 10 | 9.5 | 9.2 | 9.2 | **93.2** |
| 5 | **SuperScan Elite 17**<br>NSA/Hitachi<br>(800) 441-4832<br>$1,195<br>*Reader Service No. 766* | **Pros:** Fine colors, and we like the price. Not a runaway winner, but it won't let you down.<br>**Cons:** Focus wandered around the edges of the image. | 9.0 | 9.5 | 9.4 | 8.5 | 8.5 | 8.9 | 9.2 | **90.9** |
| 6 | **FlexScan F560iW**<br>Nanao USA Corp.<br>(800) 800-5202<br>$1,499<br>*Reader Service No. 767* | **Pros:** Solid design and nice even colors. Both Nanao monitors are well-supported.<br>**Cons:** Text appears pale, blacks tend to appear gray. | 8.2 | 9.7 | 9.0 | 9.5 | 9.4 | 9.8 | 10 | **90.8** |
| 7 | **IBM 17P**<br>IBM<br>(800) 772-2227<br>$1,199<br>*Reader Service No. 768* | **Pros:** We like the price, support staffers were very helpful.<br>**Cons:** Colors appear muted, homely design, mediocre image quality. | 8.5 | 7.3 | 9.4 | 9.3 | 8.7 | 9.2 | 9.7 | **86.4** |
| 8 | **Optiquest 4000DC**<br>Optiquest<br>(800) 843-6784<br>$899<br>*Reader Service No. 769* | **Pros:** The competition will lose sleep over the price.<br>**Cons:** Colors are too pale and washed out for color-sensitive work. Documentation could be presented better. | 8.2 | 7.0 | 10 | 9.5 | 9.3 | 8.5 | 9.2 | **86.3** |

*PERCENTAGES REFLECT THE WEIGHT OF EACH FACTOR IN TOTAL SCORE. FACTORS ARE SCORED ON A SCALE OF 1 TO 10. TOTAL SCORES ARE NORMALIZED TO A SCALE OF 1 TO 100. NOTEWORTHY SCORES ARE HIGHLIGHTED IN RED.

## Usability Close-Up
## Go-to-Sleep Software

Nanao ships its **Energy Star monitors** with Berkeley Systems' After Dark screen saver, which has an EcoLogic feature. After a user-specified period, your screen saver is put to sleep and the monitor goes into low-power mode.

**Good Night** Want to see a screen saver disappear? It's up to you.

## Performance Spotlight: Juried Image Tests

**Overall image quality scores** and color quality scores (above) are based on several jury tests.

PHOTOGRAPH BY ARNOLD TOSELIO

GRAPHICS AND MULTIMEDIA ACCELERATOR

# Killer Pixels

## •123 Million Winmarks†
## •1280x1024 in 16.7M colors
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ATI's GRAPHICS PRO TURBO unleashes hordes of killer pixels that will turn your PC into an amazing hive of graphics activity. Stirred up by our *mach64*, 64-bit accelerator chip, your applications will be swarming across the screen at speeds of over 100 million Winmarks*. And your DOS applications will run faster than ever before.

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ATI's deadly new strain of pixels is not only fast, it's vibrantly colored as well, with accelerated 24-bit true color that never stops working, even at resolutions as high as 1280x1024. GRAPHICS PRO TURBO runs in 16.7 million colors as fast as other cards do in just 256.

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GRAPHICS PRO TURBO has a real buzz for Windows users too, with acres of virtual desktop and flicker-free graphics at up to 100Hz refresh. Exclusive software handles color calibration, and our unique WinSwitch lets you change color and resolution modes without restarting Windows. Plus, the GRAPHICS PRO TURBO makes full-motion video really hum with no additional multimedia hardware. So don't bee stung by lesser graphics.

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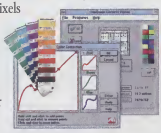
*Desktop settings*



*Color calibration*

*Easy control of desktop settings and color calibration with FlexDesk panel.*

*True Color + High Resolution*

*WinSwitch changes color and resolution... without leaving Windows.*

*COMPLETE PERFORMANCE DATA*
*(Larger numbers are better)*

| | GRAPHICS PRO TURBO | Matrox MGA II+ | Diamond Viper |
|---|---|---|---|
| Winbench 3.11 1024x768 256 colors | 123.0 | 93.5 | 85.1 |
| Winbench 3.11 1024x768 65K colors | 42.5 | 35.5 | 23.9 |
| Winbench 3.11 1024x768 16.7M colors | 26.0 | 14.9 | 5.6 |
| Quake Performance | 3,871 | 575 | 1,685 |
| Motion Video Performance | 24 | 11 | 13 |

*GRAPHICS PRO TURBO outperforms other accelerators.*

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- Dynamic monitor control and adjustment
- Drivers for OS/2, CAD, DOS and more
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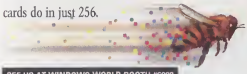

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76004,3656

* All performance tests done on a Pentium P54C 100MHz, 16MB RAM, 256K cache, 420MB HD, using 2MB PCI graphics cards. † Winbench 3.11 at 1024x768 resolution, 256 colors at 70Hz
†† DOS performance tested using PC Bench 8.0 (video harmonic) ††† Motion Video performance measured under Windows using 65K colors. Test clip recorded at 320x240 at 30 fps using Indeo codec.

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**Suggested U.S. retail prices, dealers may sell for less.

Circle 112 on reader service card.

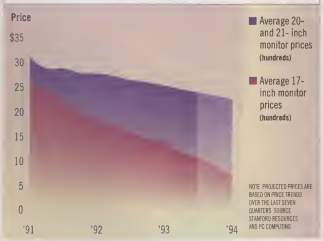
# Windows on Steroids: The Ultimate Big Displays

Only a year ago, roomy 20- and 21-inch displays might have seemed like overkill for most desktop PCs—like buying a tank to drive to the corner store. No longer. Resolutions of 1,024 by 768 pixels, 1,280 by 1,024, and higher (which allow you to view much more information on your screen at once) are now standard on most high-performance video cards. Spacious 20- and 21-inch displays allow you to look at these ultrahigh resolutions without eyestrain, even if you work with tiny type and fine lines for desktop publishing, illustration, and design, or if you merely need to view several Windows applications at once.

Image quality is critical in displays this large because irregularities in colors, glare, and other flaws tend to be magnified. To get the best image quality possible, we tested only monitors that use flat-square or Trinitron-style tubes, which minimize glare and distortion. To qualify for this year's *PC Computing* Best 200, monitors also had to have a dot pitch of 0.31mm or smaller (the finer the dot pitch, the sharper the image focus).

## Market Trends: Monitor Prices

1. Prices Won't Drop Much in 1994
2. Expect Under-$500 17-inch Monitors in '95
3. Monitors Are Cheaper Bundled with Systems




**The Waiting Game:** It takes a long time for cutting-edge monitors to drop in price, but more mature models get cheaper rapidly. Still, 20- to 21-inch monitors are best for displaying today's graphical applications.

We also required that they include microprocessor-based digital controls for fine-tuning the image.

Large displays make higher resolutions possible, which is why we also required that all of the monitors support resolutions of up to 1,280 by 1,024 at flicker-free 76Hz (or higher) refresh rates. Finally, we required that all of the monitors conform to the Swedish MPR II low-emissions standard, and that they support power management—important in displays this size because they often account for 80 percent of a system's overall power consumption.

**Factors and Weights** Image quality is essential in displays this large, so it accounts for 35 percent of a monitor's score, and takes into consideration focus, brightness, contrast, and overall ability to display text and images. Color quality accounts for 20 percent of the score and reflects a juried panel's evaluation of color quality (dark blacks, bright whites, and evenly saturated colors) as well as color convergence. Price is also a major consideration, accounting for 15 percent of a product's total score.

Video signals supported make up 10 percent of a display's overall score and indicate how well a monitor handles different video modes, the number of video image settings it stores in memory, its vertical and horizontal refresh rates, and its bandwidth—factors that affect a monitor's ability to work with a range of display adapters. Construction makes up 10 percent of the total score and takes into account the monitor's controls, active display area, glare, overall construction quality, and power consumption.

Service and support account for 5 percent of a product's score and include whether the warranty covers both parts and labor. Many of these monitors have sophisticated image and color controls, so we gave points for documentation (5 percent) as well. In most cases, controls were explained thoroughly.

**How We Tested** ZD Labs performed all of the juried image quality and performance tests. Using a suite of test images and text documents, our technicians measured the monitors' focus, distortion, glare, overall image geometry (whether circles appear round or oval, for example), and color saturation. They also tested the displays' brightness, color convergence, power consumption, and other factors. All of the monitors were tested on identical 33MHz 486DX systems using Graphics Ultra Pro video adapters from ATI Technologies. WENDY TAYLOR

# "Do I Look Like An Accountant?"

**"I like to work with video equipment, not with numbers. But I have to do both to stay on top of my business. So I found the easiest way – QuickBooks®.** I just sit down at the computer and the screen looks just like an invoice. QuickBooks memorizes everything. I type a keystroke or two to start most entries — and it finishes it for me — amazing. In a small business like mine, accounts receivable is very important and QuickBooks does it all for me automatically. The accounts receivable aging lets me know what my clients owe and for how long. The instant collections report tells me everything I need to know about my overdue accounts including the names and phone numbers to call. I never pictured bookkeeping being this easy."

*Eric Replinger*
*Video Producer, Colorado Springs, CO*

**"Until QuickBooks, doing the bookkeeping was the craziest part of running our psychiatric management office.** My favorite thing about QuickBooks is the reports. I can create reports just about any way I need them. I just scroll down a menu, select the kind of report, set the beginning and ending date, hit "enter" a couple of times and the report is done. That's it. I can even get comparison reports to see how things are doing from one day or one year to the next.

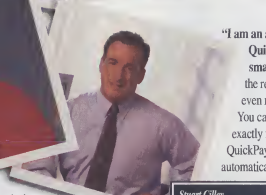
QuickInsight™ graphs give me a picture of the trends — and QuickZoom™ lets me see the numbers behind the graphs. QuickBooks is bookkeeping sanity, at last."

*Susan Yeagley Sullivan*
*Psychiatric Management, San Diego, CA*

**"Last time I looked in the mirror I ran a dairy business.** That means I can't afford to spend more time keeping my records than producing. When it comes to accounts payable, QuickBooks is a lifesaver. I just run a monthly cash flow report to time my purchases to match my inflows and outflows of money. I ask QuickBooks to tell me which bills are due, then decide which ones to pay— and it practically writes the checks for me. No question, I would recommend QuickBooks to anyone else in my field."

*Craig Trible*
*Dairy Business Operator, Troy, VT*

**"I am an accountant. And I recommend QuickBooks to anyone who has a small business.** Here are just some of the reasons. First, it's easy. You don't even need to know a debit from a credit. You can easily customize QuickBooks exactly for your business — perfect. QuickPay™ gives you complete payroll automatically, calculating deductions and maintaining employee information.



*Stuart Cilley*
*CPA, Rohnert Park, CA*

And here's the best part: come tax time all the information is there — you just print out the right reports for your accountant. Whenever I begin consulting a small business I ask two questions: 'Do you have a computer?' and 'Do you have QuickBooks?' "

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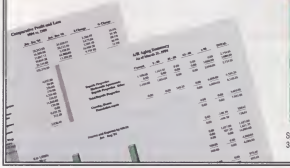

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System requirements: DOS: IBM® compatible PC, 640K RAM. DOS 3.0 or higher and 3.2 MB free on hard disk. Windows: IBM® compatible PC, 386 or higher, 2MB RAM minimum, (4MB recommended). Windows 3.1 or higher, 8MB free on hard disk. DOS and Windows feature sets vary.
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## Picture Publisher LE

Picture Publisher is an exciting image editing tool for enhancing and manipulating your photographs. Picture Publisher is a three-time winner of *Publish magazine's* "Reader's Choice" award and *PC Magazine's* "Editor's Choice for 1992" for best PC Image-editing software.

## Business Card Reader

Business Card Reader is an exciting personal productivity software that captures and stores printed information from cards into a built-in database for easy and instant retrieval. "You won't go wrong with BCR software with its wealth of useful and usable features." —*Accounting Technology Magazine.*

# Grand Color Solutions for Under a Grand

PC Computing Hardware 200 Finalist 1994

## ScanOffice | Color

## Windows Draw LE

Windows Draw LE is a fun and friendly drawing program for everyone providing creative drawing tools, hundreds of clip art images and numerous special effects for your drawing needs. Windows Draw was named "Best New Desktop Publishing Product" by *Computer Currents* and "One of the Ten Hottest" Windows applications by *Compute* magazine.

## CuneiForm OCR

CuneiForm OCR is the most accurate and fastest Optical Character Recognition for scanning text and documents. Cognitive CuneiForm was ranked top five for the best buy in OCR packages by *Imaging Magazine*, December 1993.

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THE MAGIC OF COLOR

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## DECISION MAKER

HOW TO BUY THE BEST **20- OR 21-INCH MONITOR** FOR YOUR BUSINESS

**1** Choose the factor most important to you. **2** Choose the next most important factor. **3** What else is important? **4** For your needs, the best product to buy is . . .

| | | | |
|---|---|---|---|
| Image Quality | Color Quality | Construction | Nanao FlexScan F760iW |
| | | Video Signals | Nanao FlexScan F760iW |
| | Construction | Price | NEC MultiSync 6FGp |
| | | Video Signals | IBM 21P |
| Price | Image Quality | Color Quality | IBM 21P |
| | | Video Signals | Nanao FlexScan F760iW |
| | Construction | Service & Support | NEC MultiSync 6FGp |
| | | Video Signals | Nanao FlexScan F760iW |
| Video Signals | Image Quality | Color Quality | Nanao FlexScan F760iW |
| | | Construction | Nanao FlexScan F760iW |
| | Price | Color Quality | IBM 21P |
| | | Service & Support | NEC MultiSync 6FGp |

PC Best

### 20- or 21-inch Monitor

## Nanao FlexScan F760iW

**IMAGE QUALITY:** Nanao's FlexScan F760iW wowed our jury testers and earned top honors in this test category. For running 1,280-by-1,024-pixel resolution at 76Hz, it's the leader of the pack.

**COLOR QUALITY:** It almost edged out Nokia's Multigraph 445X here. The jury found colors bright and true.

**PRICE:** At less than $2,400, it's relatively inexpensive.

**VIDEO SIGNALS:** In our power management tests, it consumed little power. It's as green as they get.

**CONSTRUCTION:** The FlexScan F760iW's design is flawless.

**FlexScan F760iW** / Nanao USA / (800) 800-5202 / (310) 325-5202 / $2,399
*Circle No. 770 on Reader Service Card*

PHOTOGRAPH BY MARK JOHANN

# Best 200 Video

## 20- and 21-inch Monitors

| Rank | Product | Pros & Cons | Image Quality 35%* | Color Quality 20% | Price 15% | Video Signals 10% | Construction 10% | Documentation 5% | Service & Support 5% | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|
| Best 1 | **FlexScan F760iW**<br>Nanao USA Corp.<br>(800) 800-5202<br>$2,399<br>*Reader Service No. 770* | **Pros:** For displaying text and graphics, it's the finest. Our jury came away impressed.<br>**Cons:** None. | **10** | 9.7 | 9.5 | 9.9 | 10 | 9.8 | 10 | **98.5** |
| 2 | **IBM 21P**<br>IBM PC Company<br>(800) 772-2227<br>$2,249<br>*Reader Service No. 771* | **Pros:** A favorite with jury testers, good price for its class.<br>**Cons:** It's boxy—a sharper design wouldn't hurt. | 9.7 | 9.0 | 9.8 | 9.5 | 9.3 | 9.2 | 9.7 | **94.9** |
| 3 | **MultiSync 6Fgp**<br>NEC Technologies<br>(800) 388-8888<br>$2,125<br>*Reader Service No. 772* | **Pros:** Beautiful colors, smart design.<br>**Cons:** Jury testers favored the F760iW and IBM 21P for displaying text. | 8.2 | 9.0 | **10** | 9.5 | 9.5 | 10 | 10 | **90.7** |
| 4 | **Diamond Pro 21T**<br>Mitsubishi Electronics<br>(800) 843-2515<br>$2,525<br>*Reader Service No. 773* | **Pros:** Outstanding focus, clear, bright whites. Good reviews from the jury.<br>**Cons:** It costs a bit more than its competitors. | 9.1 | 8.4 | 9.2 | 9.6 | 9.3 | 8.9 | 9.7 | **90.7** |
| 5 | **SuperScan Elite 21**<br>NSA/Hitachi<br>(800) 441-4832<br>$2,295<br>*Reader Service No. 774* | **Pros:** Good image geometry, consumed less power than any other.<br>**Cons:** Doesn't switch video resolutions smoothly. | 9.4 | 8.3 | 9.7 | 8.9 | 8.5 | 8.9 | 9.2 | **90.5** |
| 6 | **FlexScan T660i**<br>Nanao USA<br>(800) 800-5202<br>$2,699<br>*Reader Service No. 775* | **Pros:** Rugged design, near-perfect construction.<br>**Cons:** Jury testers found its colors too dull, smallest image size (20-inch diagonal tube). | 8.4 | 8.8 | 8.9 | 9.6 | 9.6 | 9.8 | 10 | **89.5** |
| 7 | **Multigraph 445X**<br>Nokia Display Products<br>(800) 296-6542<br>$3,225<br>*Reader Service No. 776* | **Pros:** Good construction, innovative onscreen controls.<br>**Cons:** Jury criticized its focus, high price. | 7.5 | **10** | 8.4 | 9.4 | 9.4 | 9.6 | 9.5 | **87.2** |
| 8 | **VisionMaster 21**<br>Idek Iiyama North America<br>(800) 394-4335<br>$2,495<br>*Reader Service No. 777* | **Pros:** Fair all-around performer.<br>**Cons:** The jury thought the antiglare coating degrades focus. | 8.0 | 8.8 | 9.3 | 9.3 | 9.1 | 8.9 | 9.2 | **87.0** |
| 9 | **Mag MX21F**<br>Mag InnoVision<br>(800) 827-3998<br>$2,499<br>*Reader Service No. 778* | **Pros:** LED readout displays active resolution and refresh rate.<br>**Cons:** Detachable base is prone to breaking. | 8.1 | 8.6 | 9.3 | 9.3 | 8.4 | 8.7 | 9.0 | **86.1** |

*PERCENTAGES REFLECT THE WEIGHT OF EACH FACTOR IN TOTAL SCORE. FACTORS ARE SCORED ON A SCALE OF 1 TO 10. TOTAL SCORES ARE NORMALIZED TO A SCALE OF 1 TO 100. NOTEWORTHY SCORES ARE HIGHLIGHTED IN RED.

## Usability Close-Up
## One-Touch Touchdown

**Nokia's Multigraph 445X** has four image-control buttons. Touch the menu button and a text menu listing image-control options pops onscreen in front of your applications. Customization is easy.

**Image Controls** Nokia does it all with custom pop-up software.

## Performance Spotlight: Juried Image Tests

**Overall image quality scores** and color quality scores (above) are based on several jury tests.

PHOTOGRAPH BY ARNOLD TOSKUD

PHOTOGRAPH BY DAVID PERRY

## WENDY TAYLOR **FlexScan F560iW**

I'll admit it: I'm spoiled. I've installed, tested, wrestled with, and written about hundreds of monitors and video cards—and that's just in the past few months. So what do I want on my desk? No contest: Nanao's shrewdly designed 17-inch FlexScan F560iW monitor. Everything about the FlexScan says precision. Space-age digital controls adjust everything from the monitor's color to its aura. Its wide 17-inch tube cuts glare without killing the focus. And no matter what graphics card I pair it with, the F560iW beams cheerfully to life—even at resolutions as high as 1,280 by 1,024. Trust your retinas. Not only does the F560iW deliver razor-sharp focus, it's easy on this editor's eyes—even into the wee hours of the morning.

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Chances are you're not the only one working on the project. Microsoft Project was developed with this in mind.

You can now distribute reports through your existing electronic mail system.* Click on a button to collaborate. Click to delegate. Click to get the status of your plan. Even set reminders on important tasks.

To do all this (and a lot more) all you have to do is take the first step: Call Microsoft at (800) 671-3955, Dept. KZ5, for more information or for the name of a reseller near you.

You'll wonder how you ever managed without it.

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**Microsoft**

*Some workgroup features require MAPI-compliant mail systems, acquired separately. © 1994 Microsoft Corporation. All rights reserved. Microsoft is a registered trademark and IntelliSense is a trademark of Microsoft Corporation. In the 50 United States, call (800) 671-3955, Dept. KZ5. Customers in Canada, call (800) 563-9048. Outside the 50 United States and Canada, call your local Microsoft subsidiary or (206) 936-8661.

# Storage

**SYNOPSIS**

**HARD DRIVES:** *Windows read/write tests? Easy setup? We've got the top IDE and SCSI drives.* **202**

**TAPE DRIVES:** *We tested network and desktop products. They're all here.* **208**

**CD-ROM DRIVES:** *Superfast quad-speed and jukebox drives ran away with performance honors.* **214**

**EDITOR'S CHOICE:** *A monster-size jukebox slakes CD-ROM thirst with three six-packs.* **219**

A gigabyte ain't what it used to be. One hundred megabytes here, one hundred megabytes there . . . pretty soon you're talking about real storage. Today's overstuffed applications shoulder part of the blame. It's not unusual for a single program to use 40MB or more of hard disk space. And today's rich data types (compound documents, object-oriented databases, full-motion video, and so on) devour magnetic and optical media like swarms of byte-sized locusts.

Just processing all that data can be a full-time job, so you can't afford a storage device that's too small, too slow, or worst of all, just plain wrong for the job. That's why we've covered a full spectrum of storage options: hard drives for fast access to everyday files, tape drives to keep data safe, and CD-ROM drives to eliminate the need for mile-high piles of floppy disks.

The most important storage device is your hard drive, traditionally an IDE drive on the desktop or a SCSI drive on the server. And the rule of thumb is simple: You always need more hard drive capacity than you think you need. Fortunately, the latest generation of hard drives has broken the gigabyte barrier for around one dollar per megabyte.

Is your data safe? Ha! Murphy's Law has no respect for mean time between failure (MTBF) ratings. That's why we've tested tape backup drives in two classes. For desktop PC tasks, 250MB QIC drives are cheap (typically only a few hundred dollars) and reliable. For network backup tasks, the answer is a fast DAT drive with the software that can boost compression ratios. At average prices of $1,300 and up, they don't sound cheap—until you use one to restore a server full of priceless data.

And then there are CD-ROM drives, which aren't just for games anymore. Today's CD-ROM drives can pump data faster than ever. We tested double-speed drives, triple-speed drives, and quad-speed drives that hit data-transfer rates of 455 kilobits per second.

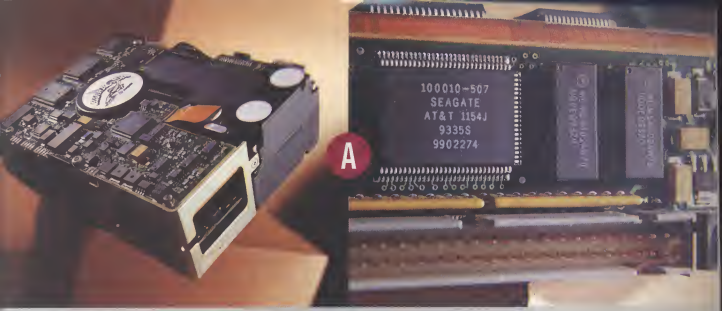
A gigabyte here, a gigabyte there . . . it all adds up. Maybe in next year's *PC Computing* Best 200 we'll be testing terabyte storage for desktops. Time flies and megabytes multiply. ED BOTT

**A SPACIOUS:** The two tiny chips on the 2.1GB **Seagate ST12550N** together represent 1MB of cache for the drive—as much as 286 machines had in system RAM.

**B QIC VS. DAT:** For smaller tape backups, choose a QIC drive like the **Tandberg Data Panther Server Backup** tape drive (left); for high-capacity backups, choose a DAT drive like the **Sony SDT 5000** (right).

**C CADDY, YES OR NO:** Loading CDs without a caddy may be more convenient, as with the **Chinon CDX-535** (left), but a caddy, like the one found in the **Mitsumi CRMC FX001D** (right), protects CDs much better.

PHOTOGRAPHS BY MARK JOHANN




Doesn't matter whether you prefer 650MB CDs, 2GB hard disks, or 4GB tapes–

there's a drive here with all of the storage capacity you could possibly need.

# Capacity Up, Size Down, Prices Keep on Plunging

It seems as if software companies now measure their products by the megabyte, and it's your disk space that suffers. Load up three major applications, and 100MB disappear faster than snowballs in Miami. A year ago, 250MB was a respectable size for a hard drive. This year, drives offer much bigger capacities, at much lower prices. We chose 500MB, 1GB, and 2GB IDE and SCSI drives for this year's *PC Computing* Best 200 testing.

Our tests at ZD Labs turned up something for everyone. Whether you're equipping a desktop system or a server, there's good news. Hard drives are getting smaller. Most of the drives we tested have shrunk to one inch in height. The industry doesn't measure drives as full-height or half-height anymore—it's down to inches. Nearly all the drives we tested also cost close to one dollar per megabyte. The top drives were closely matched down to inches and cents.

**Factors and Weights** When you gauge a hard drive, start with price and performance. While the gaps are narrowing, there are still some significant differences among drives. Performance—the single most significant factor in our scoring—accounts for 30 percent of our total score, followed closely by price at 25 percent. Performance ranks are based on disk throughput and disk-access time tests. Price scoring is based on the cost per megabyte for each drive. List prices on hard drives are moving targets, so we gathered prices from several sources—mail order and retail—and evaluated the ranges. Service and support get a 20 percent weighting. We focused on warranties, and we gave high scores to manufacturers that service their products directly, instead of leaving that responsibility to distributors. Features and technology, weighted at 15 percent, focus on how advanced the technology is and how well it is implemented. Drives with large caches earned bonus points, as did those with cutting-edge technology. Packing 1GB into a 1-inch form factor is a genuine technology win, so we awarded extra points to drives that made the grade here. Making drives smaller allows for easier installation, but you won't get far without clearly labeled jumpers, standard default settings, and well-placed connectors. We weighted our final category—ease of installation—at 10 percent of our total score.

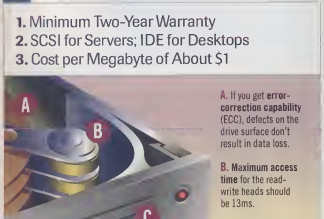
**How We Tested** We installed each drive in a Dell 33MHz 486 model 433/ME with 16MB of RAM. Then we connected each IDE drive to Dell's embedded IDE controller and attached each SCSI drive to the industry-standard Adaptec AHA-1542C.

All of our tests were performed using MS-DOS 6.2 and Windows 3.1. Default settings for DOS and Windows were used, including SmartDrive. Each drive was configured as the C: drive and partitioned using the standard Fdisk utility supplied with DOS. When additional software was bundled with the drive (for example, Micropolis included custom partitioning software) we repeated all our tests, using the included utilities. Our tests included PCbench, Winbench, and opening a 44MB Adobe Photoshop TIFF file.

PCbench performs reads and writes on random and sequential files ranging from 256K to 32MB. It produces a single score for drive performance under DOS. Winbench runs similar tests, producing a score that reflects performance under Windows. Our test of opening an Adobe Photoshop file began when we clicked on OK in the File, Open dialog box and ended when the file was open. Each test represents 33 percent of the performance score. ADAM MEYERSON

## Technical Checkpoints: Hard Drives

1. Minimum Two-Year Warranty
2. SCSI for Servers; IDE for Desktops
3. Cost per Megabyte of About $1




**Watch Those Numbers:** Access and seek time are two different numbers. Access time combines seek time and the drive's rotational latency—the time it takes the disk to spin the data you want around to the read-write heads.

## DECISION MAKER HOW TO BUY THE BEST **HARD DRIVE** FOR YOUR BUSINESS

| 1 Choose the factor most important to you. | 2 Choose the next most important factor. | 3 What else is important? | 4 For your needs, the best product to buy is . . . |
|---|---|---|---|
| Desktop Drive | Price per Megabyte | Performance | Western Digital Caviar 254U |
| | | Service & Support | Seagate ST3655A |
| | Performance | Price per Megabyte | Micropolis 2210A |
| | | Service & Support | Micropolis 2210A |
| High-Capacity Desktop Drive | Performance | Price per Megabyte | Micropolis 2210A |
| | | Service & Support | Micropolis 2217A |
| | Expandability | Price per Megabyte | Quantum Empire 1080 |
| | | Performance | IBM 0662 |
| Server Drive | Price per Megabyte | Performance | Quantum Empire 1080 |
| | | Service & Support | Quantum Empire 1080 |
| | Performance | Price per Megabyte | HP C2490A |
| | | Service & Support | Seagate ST12550N |

PC Best

### Hard Drive

# Micropolis 2210A

**PERFORMANCE:** Micropolis's IDE drive placed first in two performance tests: PCbench and Winbench.

**PRICE:** You won't find lower prices for anything near a gigabyte of storage.

**SERVICE AND SUPPORT:** Micropolis backs the drive with a five-year warranty—longer than most.

**FEATURES AND TECHNOLOGY:** Included with the 2210A is OnTrack Computer Systems' amazing Disk Manager software. Disk Manager breaks the 528MB barrier typical of IDE drives. We got a full 976MB capacity.

**EASE OF INSTALLATION:** The drive took longer to install than some of the others.

**Micropolis 2210A** / Micropolis / (800) 395-3748 / (818) 709-3300 / $869/$1,099
*Circle No. 781 on Reader Service Card*

PHOTOGRAPH BY MARK JOHANN

# Best 200 Storage

## IDE Hard Drives

| Rank | Product | Pros & Cons | Performance 30%* | Price 25% | Service & Support 20% | Features & Technology 15% | Ease of Installation 10% | Total Score |
|---|---|---|---|---|---|---|---|---|
| Best 1 | **Micropolis 2210A** (976MB) Micropolis (800) 395-3748 $869/$1,099 *Reader Service No. 781* | **Pros:** Top-notch performance, excellent price, cutting-edge technology. We loved the bundled Disk Manager software, which nearly doubled the capacity. **Cons:** Difficult to install. | 9.9 | 9.9 | 9.4 | 9.2 | 8.6 | **95.7** |
| 2 | **Caviar 2540** (540MB) Western Digital (800) 275-4932 $499/$579 *Reader Service No. 782* | **Pros:** Well designed with clear, concise labeling. For a medium-capacity drive, the price is right. **Cons:** Three-year warranty is good, but not great. Performance could be better. | 8.7 | 10 | 9.4 | 8.6 | 8.8 | **91.6** |
| 3 | **Seagate ST3655A** (528MB) Seagate (408) 438-8111 $550/$619 *Reader Service No. 783* | **Pros:** Includes power-management software, fairly easy installation routine. **Cons:** Performance could be better. It wasn't slowest, but this drive didn't stand out in any speed tests. | 8.7 | 9.3 | 10 | 8.3 | 8.9 | **90.7** |
| 4 | **Micropolis 2217A** (1.6GB) Micropolis (800) 395-3748 $1,149/$1,489 *Reader Service No. 784* | **Pros:** Huge capacity for an IDE drive. An impressive drive in speed tests. **Cons:** Difficult to install. Both Micropolis drives cost us time during setup. | 9.6 | 7.2 | 9.4 | 9.5 | 8.6 | **88.5** |
| 5 | **ProDrive LPS 540 AT** (541MB) Quantum (800) 624-5545 $595/$599 *Reader Service No. 785* | **Pros:** Relatively easy to install, good support too. **Cons:** Two-year warranty is too short, no performance champ. | 8.4 | 9.0 | 9.4 | 8.2 | 9.4 | **88.2** |
| 6 | **Filepro Performance 540** (546MB) Conner (408) 456-4500 $511/$689 *Reader Service No. 786* | **Pros:** Thorough labeling makes for easy installation. **Cons:** Two-year warranty is too short. Bottom or near bottom in all our speed tests. You'll yearn for more speed. | 8.0 | 8.6 | 9.2 | 8.3 | 9.6 | **86.0** |

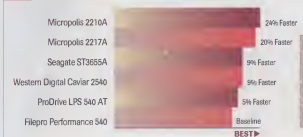
*PERCENTAGES REFLECT THE WEIGHT OF EACH FACTOR IN TOTAL SCORE. FACTORS ARE SCORED ON A SCALE OF 1 TO 10. TOTAL SCORES ARE NORMALIZED TO A SCALE OF 1 TO 100. TWO PRICES ARE CITED FOR EACH DRIVE: THE FIRST IS THE LOWEST RETAIL OR MAIL-ORDER PRICE WE COULD FIND, AND THE SECOND IS THE HIGHEST PRICE WE FOUND.

## U Usability Close-Up: Super-Easy Software

There's no reason why IDE can't keep up with SCSI in capacity. **Disk Manager** utility software, bundled with Micropolis's drives, gives you the best of both worlds. It breaks the 528MB IDE boundary and nearly doubles the capacity of IDE drives.

**More Room** Disk Manager earned us plenty of extra capacity on our 2210A.

## P Performance Spotlight: Windows Speed




Overall scores for performance (above) are based on Windows tests, DOS tests, and opening Photoshop files.

# FINALLY, there's a place for people like *BOB KESWICK.*

A guy like Bob gives you his card. A card for some reason you want to hang on to. So what do you do? Probably throw it in that business card graveyard you've got going in the back of your desk somewhere.

Which is exactly why we came up with CardGrabber™. It's a quick, painless way to transfer all the information from business cards into a convenient database.

Start with our tiny, palm-sized scanner. One that's plug and play, so it connects directly to your desktop or notebook computer, without requiring some kind of surgery to install extra hardware.

In a flash, a business card is scanned, and all information is automatically entered into the appropriate lines of an address book.

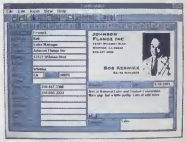
Then, by either the card image or name, you can customize it. Search it. Rearrange it. Or import/export to just about any conceivable PIM or database.

So you can start turning those business cards into something else. Business leads.

Pick up the phone and call us at 1-800-870-3391 K51. Or contact one of your local resellers.

And suddenly, Bob's business card will be just like Bob.

Tough to lose.



## CardGrabber

THE BUSINESS CARD SCANNER

**Circle 256 on reader service card.**

PACIFIC CREST TECHNOLOGIES, INC.

COMPUSA

EGGHEAD SOFTWARE

CardGrabber is a trademark of Pacific Crest Technologies, Inc © 1993 Pacific Crest Technologies, Inc.

# Best 200 Storage

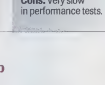
## SCSI Hard Drives

| Rank | Product | Pros & Cons | Performance 30%* | Price 25% | Service & Support 20% | Features & Technology 15% | Ease of Installation 10% | Total Score |
|---|---|---|---|---|---|---|---|---|
| Best 1 | **Empire 1080** (1.08GB) Quantum (800) 624-5545 $889/$966 *Reader Service No. 787* | **Pros:** Scored well on all performance tests, 1-inch form factor, great service and support. **Cons:** Tricky installation. | 9.1 | 9.8 | 10 | 9.3 | 9.1 | 94.9 |
| 2 | **IBM 0662** (1.05GB) IBM (800) 426-7299 $999/$1099 *Reader Service No. 788* | **Pros:** Terrific performance and great warranty and service. **Cons:** Not the cheapest. | 9.5 | 9.0 | 10 | 9.5 | 9.2 | 94.5 |
| 3 | **Micropolis 2217** (1.76GB); Micropolis (800) 395-3748 1,166/$1,399 *Reader Service No. 789* | **Pros:** Low price per megabyte and a five-year warranty. **Cons:** Not as fast as some of the others. | 8.7 | 10 | 9.4 | 9.5 | 9.6 | 93.8 |
| 4 | **Seagate ST12550N** (2.14GB); Seagate (408) 438-8111 $1,850/$2,299 *Reader Service No. 790* | **Pros:** Huge capacity, five-year warranty, great service. **Cons:** Installation not as easy as it could be. | 9.8 | 9.0 | 9.6 | 9.4 | 8.5 | 93.7 |
| 5 | **Micropolis 2210XL** (1.05GB); Micropolis (800) 395-3748 $880/$995 *Reader Service No. 791* | **Pros:** One of the cheapest drives no matter how you slice it. **Cons:** Midrange performer. | 8.5 | 9.7 | 9.4 | 9.4 | 9.6 | 92.3 |
| 6 | **HP C2490A** (2.01GB) Hewlett-Packard (800) 826-4111 $1,935/$2,245 *Reader Service No. 792* | **Pros:** Fastest of all SCSI drives we tested. **Cons:** No direct technical support. | 10 | 8.8 | 8.8 | 9.0 | 8.9 | 92.0 |
| 7 | **HP C2247** (1.05GB) Hewlett-Packard (800) 826-4111 $925/$1,065 *Reader Service No. 793* | **Pros:** Solid construction with built-in drive rails. **Cons:** No direct technical support. | 8.9 | 9.1 | 8.8 | 9.1 | 8.9 | 89.6 |
| 8 | **Filepro Performance ** 1060S** (1.08GB) Conner; (408) 456-4500 $939/$999 *Reader Service No. 794* | **Pros:** Excellent price. **Cons:** Lagged in several of our performance tests. | 7.0 | 9.5 | 9.8 | 9.1 | 8.9 | 86.9 |
| 9 | **ProDrive LPS 540 S **** (541MB); Quantum (800) 624-5545 $535/$575 *Reader Service No. 795* | **Pros:** Good support. **Cons:** Short two-year warranty doesn't match up to the three that most drives feature. | 8.0 | 8.9 | 9.4 | 8.5 | 9.1 | 86.9 |
| 10 | **Seagate ST31200N** (1.05GB); Seagate (408) 438-8111 $790/$1,149 *Reader Service No. 796* | **Pros:** Great service and support. **Cons:** Very slow in performance tests. | 6.5 | 9.1 | 10 | 8.9 | 8.5 | 84.1 |

*PERCENTAGES REFLECT THE WEIGHT OF EACH FACTOR IN TOTAL SCORE. FACTORS ARE SCORED ON A SCALE OF 1 TO 10. TOTAL SCORES ARE NORMALIZED TO A SCALE 1 TO 100. TWO PRICES ARE CITED FOR EACH DRIVE. THE FIRST IS THE LOWEST RETAIL OR MAIL-ORDER PRICE WE COULD FIND, AND THE SECOND IS THE HIGHEST WE FOUND. **WHEN TOTAL SCORES TIE, THE MORE AFFORDABLE PRODUCT IS RANKED HIGHER

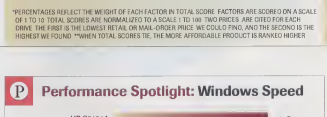
## Usability Close-Up
## Svelte SCSI Drive

Hard drives get skinnier every day. Quantum's **Empire 1080** SCSI drive fits into a 1-inch-tall form factor. Comparable drives last year took up twice the room, which meant they needed more space and caused more hassle.



**Power Pack** At 1 inch tall and 1.08GB, the Empire is power in a small package.

## Performance Spotlight: Windows Speed




Overall scores for performance (above) are based on Windows tests, DOS tests, and opening Photoshop files.

PHOTOGRAPH BY ARNOLD TOSELIO

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1994 PC MAGAZINE 100 EDITORS' CHOICE

PC MAGAZINE EDITOR'S CHOICE

Kodak

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**Circle 247 on reader service card.**

# Got 4 Gigs of Data? Go Ahead and Tape It

Nobody wants to lose mission-critical data because of a bad hard drive or a network failure. Whether it's an earthquake, flood, or any other calamity, the right tape drive and backup strategy can save your business information when it counts most.

For the *PC Computing* Best 200, we tested eight of the best desktop tape drives at ZD Labs. These drives are intended for individuals and small businesses that need a portable storage device. Most of the drives are easy to install. They have capacities of 250MB and higher and many have list prices under $500. All of these drives connect to the parallel port and use the QIC format or QIC-format minicartridge tapes.

We also tested ten network tape drives. These drives have capacities of at least 2GB and list prices less than $2,100. All the units are SCSI or SCSI-2 devices and use either QIC or DAT tapes. Our DAT drives came in two flavors this year: DDS and DDS-2 format. DDS-2 is the next generation in DAT tape technology, allowing greater data capacity, performance, and efficiency at the same price as regular DDS tapes.

Software is always an important issue. For the desktop drives, we tested each unit using its bundled Windows software. Many of these drives would deliver better performance if they shipped with better software. Network drives do not include software; you must purchase programs separately. Prices for desktop drives, however, almost always include bundled software. For network drives, Cheyenne's Arcserve NLM 5.01 was the best performing software, but it's an expensive extra. For desktop drives, Conner's bundled software, Backup Exec, was fast and reasonably priced.

**Factors and Weights** Reliable performance at a reasonable price; these are the main concerns for tape backup users. For the desktop and network tape drive categories, backup performance—which includes tape verification, data comparison, and unattended backup features—accounts for 30 percent of the total score. Accurate restore performance accounts for 25 percent of the final score.

Price is weighted at 10 percent. We considered the drive capacity to determine the price per megabyte of storage and averaged this with the list prices of the drive units. Be aware that prices are plummeting in this category. This year's prices for comparable drives were 50 percent lower than last year's prices. Few hardware categories saw such dramatic price drops.

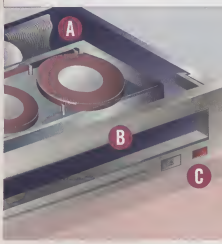
The quality of bundled software and ease of installation each account for 10 percent of the final scores. Other significant features in both tape drive categories are documentation, service and support, and exception processing (which concerns how the software handles bad data, the type and quality of error messages, and error logs). These last three factors each accounts for 5 percent of the total score.

**How We Tested** To test the speed of backup, restore, unattended backup, tape-verification and data-comparison operations for desktop tape drives, we used a 20MB data load consisting of different file types. For our tape-span test, we loaded as much data onto a tape as we could, then we tried to read the last file on the tape.

These same tests were performed on our network tape drives using Novell's NetWare Version 3.12. We conducted the server-based backup and restore tests using the NLM software package provided by each company. After each restore, we compared the data using Data Generator software to the original file set. Performance varied widely on all tests. BOB BAYLEY

## Technical Checkpoints: Tape Drives

1. Bundled Backup Software
2. At Least 2:1 Data Compression
3. Drive Capacity Matching System Capacity




A. A **SCSI interface** offers the best transfer rate (use nonproprietary controllers).

B. Look for a tape drive that will fit into a **half-height drive bay** on your server.

C. Choose **easy-to-reach controls** for tape ejection.

**Call for Backup:** The right backup software makes all the difference when you buy a tape drive. Make sure it's automated so that you can set it to run overnight, and that it will let you schedule both full and incremental backups.

## DECISION MAKER HOW TO BUY THE BEST **TAPE DRIVE** FOR YOUR BUSINESS

| 1 Choose the factor most important to you. | 2 Choose the next most important factor. | 3 What else is important? | 4 For your needs, the best product to buy is . . . |
|---|---|---|---|
| Desktop Tape Drives | Backup Performance | Service & Support | Jumbo Trakker 250 |
| | | Bundled Software | Jumbo Trakker 250 |
| | Restore Performance | Service & Support | Conner TapeStor 250 |
| | | Bundled Software | Conner TapeStor 250 |
| Network Tape Drives | Backup Performance | Restore Performance | Colorado PowerTape 4000 |
| | | Bundled Software | Conner MS4000DAT |
| | Restore Performance | Service & Support | Colorado PowerTape 4000 |
| | | Bundled Software | Conner MS4000DAT |
| Price | Parallel Port Drives | Performance | Jumbo Trakker 250 |
| | | Bundled Software | Jumbo Trakker 250 |
| | Network Tape Drives | Performance | Tandberg Panther Server |
| | | Service & Support | Tandberg Panther Server |

PC Best

### Network Tape Drive

## Conner MS4000DAT

**BACKUP PERFORMANCE:** At 12MBps, the Conner MS4000DAT was our overall fastest network tape drive.

**RESTORE PERFORMANCE:** Where accuracy counts, the MS4000DAT passed our verification tests without losing a bit.

**BUNDLED SOFTWARE:** At $995 for an unlimited license, Conner's own Backup Exec for NetWare software beats Cheyenne Arcserve's price.

**EASE OF INSTALLATION:** We'd prefer Conner dropped the proprietary SCSI controller. It's a downside.

**PRICE:** At $1,995, the price is right—you get a whopping 4GB of storage.

**Conner MS4000DAT** / Conner Peripherals / (800) 526-6637 / $1,995
*Circle No. 805 on Reader Service Card*

PHOTOGRAPH BY MARK JOHANN

# Best 200 Storage

## Desktop Tape Drives

| Rank | Product | Pros & Cons | Backup Performance 30%* | Restore Performance 25% | Bundled Software 10% | Ease of Installation 10% | Price 10% | Documentation 5% | Customer Processing 5% | Service & Support 5% | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PC Best 1 | **Jumbo Trakker 250** (250MB) Colorado Memory Systems (800) 845-7905 $399 *Reader Service No. 797* | **Pros:** Fastest overall parallel tape drive, good price, great bundled software. **Cons:** Restores files to original directory only. | 10 | 9.7 | 9.3 | 10 | 9.5 | 9.5 | 8.9 | 10 | 97.3 |
| 2 | **Tape250 Parallel Port** (250MB) Iomega Corp. (800) 777-6654 $399 *Reader Service No. 798* | **Pros:** Great software, easy to install. **Cons:** No toll-free tech support, though it does have toll-free automated voice help. | 9.9 | 9.1 | 10 | 10 | 9.5 | 8.5 | 10 | 8.2 | 95.3 |
| 3 | **TapeStor 250** (250MB) Conner Peripherals (800) 230-5638 $359 *Reader Service No. 799* | **Pros:** Lowest price, great software, excellent service and support. **Cons:** Failed to accurately restore a file that spanned two tapes. | 9.7 | 9.1 | 10 | 9.0 | 9.8 | 8.5 | 10 | 10 | 94.9 |
| 4 | **BackPack Tape Drive QIC-250MB** (250MB) MicroSolutions (800) 890-7227 $489 *Reader Service No. 800* | **Pros:** Easy to install, excellent bundled software, rugged case. **Cons:** Slow restore performance. | 9.8 | 7.0 | 10 | 10 | 8.8 | 8.5 | 10 | 10 | 90.0 |
| 5 | **Wangtek TapePort 500** (500MB) Rexon/Wangtek (800) 422-2587 $990 *Reader Service No. 801* | **Pros:** Excellent service and support. **Cons:** Poor bundled software. | 9.5 | 9.2 | 7.0 | 9.0 | 7.7 | 8.0 | 7.0 | 10 | 87.7 |
| 6 | **Valitek PST-500** (500MB) Valitek (800) 825-4835 $995 *Reader Service No. 802* | **Pros:** Excellent service and support. **Cons:** Failed to accurately restore a file that spanned two tapes. | 8.9 | 10 | 7.0 | 8.5 | 7.7 | 8.0 | 7.0 | 10 | 87.4 |
| 7 | **Panther Portable 525 E** (525MB) Tandberg Data (800) 258-8285 $1,295 *Reader Service No. 803* | **Pros:** High capacity, rugged design, excellent support, good restore performance. **Cons:** Poor bundled software. | 8.6 | 9.4 | 7.0 | 8.5 | 7.9 | 8.0 | 7.0 | 9.0 | 84.7 |
| 8 | **SideCar II** (305MB) Mountain Network Solutions (800) 458-0300 $475 *Reader Service No. 804* | **Pros:** Great price, easy to install. **Cons:** Free technical support for only 60 days. | 9.2 | 7.0 | 7.9 | 9.5 | 9.4 | 8.5 | 8.8 | 7.0 | 84.1 |

*PERCENTAGES REFLECT THE WEIGHT OF EACH FACTOR IN TOTAL SCORE. FACTORS ARE SCORED ON A SCALE OF 1 TO 10. TOTAL SCORES ARE NORMALIZED TO A SCALE OF 1 TO 100. CAPACITIES LISTED INDICATE MAXIMUM COMPRESSED STORAGE POTENTIAL. PRICE SCORES TAKE INTO CONSIDERATION THE PRICE PER MEGABYTE

## Usability Close-Up
## Software that Talks Back

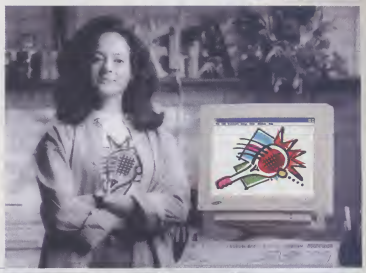
**Backup Exec** software by Arcada is bundled with the Conner TapeStor 250. The software is friendly and full of feedback. The process of including and excluding files for backup is nearly effortless. A button bar helps configure preferences.

**Do It Your Way** Backup Exec sets your preferences and keeps you informed.

## Performance Spotlight: Backup Speed

**Overall scores** for backup performance (above) are based on several backup tests of many different file types.

# Samsung
# A new point of view.



## SyncMaster 17GL

## SyncMaster 17GLs

It's about how you work...Attitude. Satisfaction. Pride. The 17-inch SyncMaster™ monitors reflect today's changing lifestyles. Hassle-free. Value-oriented.

Samsung took for granted you wanted bright, crisp clear images that don't flicker. You're also concerned about safety and energy conservation, so they're standard on the whole series.

Life should be as simple as possible, so we added innovative new features like On-Screen Display and Real Color Control, and as you would expect, the GL Series comes with a two-year limited warranty.

Think about how you view your work. Samsung did. And came up with a whole new point of view.

TECHNOLOGY THAT WORKS FOR LIFE

SAMSUNG ELECTRONICS

| SyncMaster | 14GL | 15GL | 17GL | 17GLs |
|---|---|---|---|---|
| Size | 14" | 15" | 17" | 17" |
| Dot Pitch | .28 | .28 | .28 | .26 |
| Maximum Resolution | 1024x768 | 1024x768 | 1280x1024 | 1600x1280 |
| Maximum Refresh Rate at Maximum Res. (Hz) | 76 | 76 | 60 | 60 |
| MPR-II (Low Radiation) | • | • | • | • |
| Power Management | • | • | • | • |
| Flat Square Screen | | • | • | • |
| On-Screen Programming | | | • | • |
| Real Color Control | | | | • |
| Warranty | 2 Years | 2 Years | 2 Years | 2 Years |

©1995 Samsung Electronics America Inc. The 17th Energy Star Logo and its like are (are) a product endorsement. Logo on SyncMaster 17GLs and the 17 Mac Gal Series. Image on SyncMaster 17GLs courtesy of Grand Slam.

**Circle 250 on reader service card.**

# Best 200 Storage

## Network Tape Drives

| Rank | Product | Pros & Cons | Backup Performance 30%* | Restore Performance 25% | Bundled Software 10% | Ease of Installation 10% | Price 10% | Documentation 5% | Exception Processing 5% | Service & Support 5% | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PC Best 1 | **Conner MS4000DAT** (4GB); Conner (800) 526-6637 $1,995 *Reader Service No. 805* | **Pros:** Fastest overall drive tested. Excellent service and support. **Cons:** Uses proprietary SCSI controller. | 10 | 9.8 | 9.4 | 9.0 | 8.6 | 10 | 7.5 | 10 | 95.3 |
| 2 | **PowerTape 4000** (4GB) Colorado Memory Systems (800) 845-7905 $1,695 *Reader Service No. 806* | **Pros:** Excellent backup and restore performance, very consistent. **Cons:** Software failed only once during testing. | 10 | 9.9 | 9.0 | 8.8 | 8.9 | 8.8 | 8.0 | 10 | 94.9 |
| 3 | **Sony SDT 5000** (8GB) Sony Electronics (800) 352-7669 $1,995 *Reader Service No. 807* | **Pros:** Fast, reliable DDS-2 DAT drive. **Cons:** Limited technical support. | 9.4 | 9.6 | 10 | 9.2 | 9.1 | 8.8 | 9.5 | 9.0 | 94.2 |
| 4 | **PowerTape 2400** (2.4GB) Colorado Memory Systems (800) 845-7905 $1,295 *Reader Service No. 808* | **Pros:** Low price, good performance, great service and support. **Cons:** No hardware data-compression support. | 9.6 | 9.8 | 9.0 | 8.8 | 9.0 | 8.8 | 8.0 | 10 | 94.1 |
| 5 | **HP DDS-2 C1533A** (8GB); Hewlett-Packard (800) 826-4111 $1,995 *Reader Service No. 809* | **Pros:** Great DDS-2 DAT drive; supports hardware data compression. **Cons:** Documentation was fair, but not perfect. | 9.0 | 9.6 | 10 | 9.2 | 9.1 | 9.0 | 9.5 | 10 | 93.6 |
| 6 | **Panther Server Backup** (4GB); Tandberg (800) 256-8265 $1,228 *Reader Service No. 810* | **Pros:** Very low price, great drive engine, and it's reliable. Three-year warranty. **Cons:** It's noisy. | 9.6 | 9.6 | 8.8 | 8.8 | 9.6 | 8.5 | 8.0 | 9.0 | 92.8 |
| 7 | **JetStore 5000** (5GB) Hewlett-Packard (800) 826-4111 $1,850 *Reader Service No. 811* | **Pros:** Great drive engine, easy to install. **Cons:** It's more costly than your average drive. Relatively slow. | 8.8 | 9.6 | 10 | 9.2 | 8.5 | 9.0 | 9.5 | 10 | 92.4 |
| 8 | **FileSafe 1200Plus** (4GB); Mountain (800) 458-0300 $2,075 *Reader Service No. 812* | **Pros:** Fast drive, excellent exception processing. **Cons:** Failed to restore files accurately. | 9.6 | 8.5 | 9.6 | 10 | 8.3 | 8.5 | 10 | 7.0 | 90.7 |
| 9 | **JetStore 2000** (2GB) Hewlett-Packard (800) 826-4111 $1,640 *Reader Service No. 813* | **Pros:** Great drive engine, easy to install. **Cons:** Relatively slow, as was true with HP's JetStore 5000. | 8.8 | 8.7 | 10 | 9.2 | 8.0 | 9.0 | 9.5 | 10 | 89.6 |
| 10 | **Exabyte FS4000DC** (4GB); Exabyte Corp. (800) 823-4727 $899 *Reader Service No. 814* | **Pros:** Outstanding price for a 4GB drive. **Cons:** Failed to restore a file that bridged two tapes. | 9.0 | 8.2 | 9.3 | 8.8 | 9.8 | 8.8 | 8.0 | 10 | 88.8 |

*PERCENTAGES REFLECT THE WEIGHT OF EACH FACTOR IN TOTAL SCORE. FACTORS ARE SCORED ON A SCALE OF 1 TO 10. TOTAL SCORES ARE NORMALIZED TO A SCALE OF 1 TO 100. CAPACITIES LISTED INDICATE MAXIMUM COMPRESSED STORAGE POTENTIAL. PRICE SCORES TAKE INTO CONSIDERATION THE PRICE PER MEGABYTE BUT PRICES DO NOT INCLUDE SOFTWARE

## Usability Close-Up: Stop DAT Hassle

Avoid the inconvenience of a clumsy tape-loading mechanism with a **DAT drive** such as HP's JetStore 5000. Minicartridges load as easily as your bank card in the ATM, and are nearly as thin. Just insert them—with no waiting.

**Load Easy** HP's JetStore 5000, an autoloading DAT drive, is as easy as a VCR.

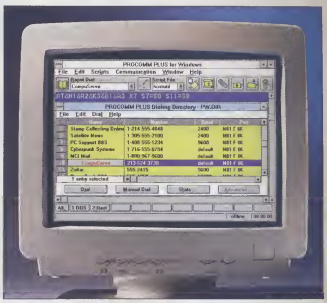
## Performance Spotlight: Backup Speed

**Overall scores** for backup performance (above) are based on several backup tests of many different file types.

PHOTOGRAPH BY ARNOLD TIDSE JO

# New Delrina WinComm PRO makes powerful communications easy. So why struggle with Procomm?

*Delrina WinComm PRO™*




*Procomm Plus™ for Windows*

To take part in the on-line revolution, you'll need a powerful communications package.

One that handles all major file transfer protocols, like Zmodem, Xmodem, Ymodem, Kermit and others. One that supports every popular terminal emulation. And has a powerful scripting language for automating on-line sessions.

But perhaps you'd prefer software that puts that power right in front of you in a clean, intuitive interface. One that not only makes it easier to go on-line but simpler to do things once you're there. With features like a customizable, icon-based phonebook. Drag-and-drop file transfer. A customizable button bar where you can place your most common tasks. Even a scroll-back buffer that lets you refer back to text from your current session, as well as text from previous sessions.

In that case the only choice is new Delrina WinComm PRO™. The one *PC Computing* called "...Intuitive enough for a novice user, yet still packed with enough sophisticated features to keep an on-line junkie happy."

| | Delrina WinComm PRO | Procomm Plus™ for Windows* |
|---|---|---|
| Pre-defined scripts for on-line services | MCI Mail, CompuServe, GEnie, AT&T Mail, BIX, Delphi, Dow Jones & NewsNet | MCI Mail & CompuServe |
| Drag-and-drop file sending | Yes | No |
| Built-in script recorder | Yes | Yes |
| Phonebook | Customizable | Fixed |
| Split-screen session window | Yes | No |
| Scrollback buffer | 200 pages | 31 pages |
| Supports all popular file transfer protocols and terminal emulations | Yes | Yes |
| Virus detection during download | Yes | No |
| Shares a COM port with WinFax PRO | Yes | No |
| Integrated off-line text editor | Yes | No |

Buy Delrina WinComm PRO alone, or as part of the money-saving Delrina Communications Suite™ which also includes Delrina WinFax PRO®, far and away the best-selling fax software in the world. Either way, you'll have the power you need and the ease of use you've only dreamed of.

Call for information or to upgrade from any Procomm product for just $49. Or see your local dealer to upgrade immediately.

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**Circle 227 on reader service card.**

# Ultimate CD Solutions For Insatiable Appetites

Unless you've missed the multimedia revolution, you already know you need a CD-ROM drive. How else can you get massive libraries of data on a single disk, as well as vast clip collections of stereo sound, high-color graphics, full-motion video—and great games?

Over the past 18 months, CD-ROM drives have picked up the pace from a baseline transfer rate of 150 kilobits per second (Kbps)—the speed that audio CDs pump out tunes—to as much as 600 Kbps with the newest quadruple-speed drives.

For this year's roundup, we evaluated external SCSI CD-ROM drives that transfer data at double, triple, and quadruple speed. We also tested jukebox drives. They all come with a hardware cache to mask that they're slower than hard disks. We also required them to handle Photo CD discs and read multiple sessions from a disc (when the data was written at different times).

**Factors and Weights** Nobody wants to wait for data—especially when it's a video clip—therefore performance counts for a lot in our evaluation: 35 percent. Our performance figures factor in the speed of finding and reading a wide variety of data in various file sizes, including the *drag* that many tasks place on the CPU; a tough job because many CD-ROM reads take place while the CPU is concentrating on several other tasks. The next most important factor is price at 20 percent, and the most expensive drives are not always the best performers. Mechanical design also figures highly in our evaluation criteria. We allotted 15 percent of the total score for design, considering such factors as layout of the controls and the presence of external controls for audio CDs (ranging from a volume wheel to a full set of play, pause, next-track, and previous-track buttons), as well as overall quality of construction.

Since installing any SCSI CD-ROM device for the first time usually requires opening up your PC, we rated ease of installation at 10 percent. This takes into account well-organized setup software, sensible cable and port placement, and default drive/interface settings that make configuration painless.

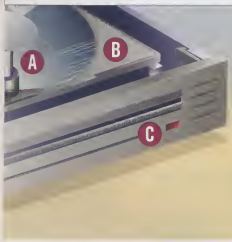
On a related issue, documentation is weighted at 10 percent, too. It's an integral part of getting the drive installed and running, and as with any hardware—especially hardware that's part of a SCSI chain—it's imperative to know how to configure it later as well as at setup. Finally, we allotted the remaining 10 percent of the total score for each drive to the company's service and support policies, giving highest scores to companies with toll-free support, online support, and warranties of more than one year. Many of the drives were backed by top-notch support personnel.

**How We Tested** ZD Labs installed each drive into a test PC, noting ease of setup, SCSI termination, and driver installation. Next, we ran speed tests on the loading of Photo CDs (as an example of large-file loading) and data access. Panels of jurors assessed the quality of video-clip playback to ensure that the drive was capable of high-volume data streaming. And because these devices double as audio CD players when you insert either a multimedia title or your favorite music disc, we ran tests on signal-to-noise ratio, frequency response, and stereo separation. But most important of all, we tested how much processing the drive performed and how much it dumped on the CPU—the bigger the burden on the CPU, the lower the drive scored. The table notes which drives dragged on the CPU.

MATTHEW LAKE

**Technical Checkpoints: CD-ROM Drives**

1. MPC-2 (Multimedia PC) Spec Conformance
2. Kodak Photo-CD Compatibility
3. SCSI-2 Compatibility



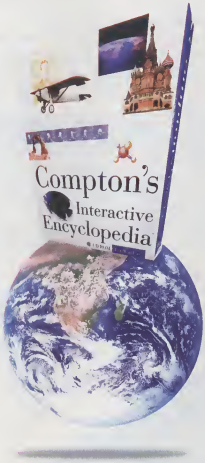

**A.** Look for a **double-speed spindle** to turn the compact disk.

**B.** **A disk caddy** protects the surface of the CD from scratches.

**C.** **Double-door designs** prevent dust and other contaminants from entering the drive.

**Double Your Pleasure:** Rarely does data flow off a CD like water over Niagara, so if you hunger for even more speed than a double-speed drive delivers, you'll get it (for a higher price) with triple- and quadruple-speed models.

# $129.

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PC MAGAZINE EDITORS' CHOICE

PC MAGAZINE Best of 1993

1993 BYTE AWARD OF DISTINCTION

FEBRUARY 1994 BYTE BEST CAD/CAM VL-BUS GRAPHICS CARD

BEST OF BYTE Spring 95

CADENCE EDITOR'S CHOICE AWARD 1993

PC Computing MVP FINALIST

PC PROFESSIONAL IMPELLING-DER REDAKTION

IMAGING BUSINESS EDITORS' CHOICE

PC Direct

CHIP CHIP

winner

PERSONAL COMPUTER

L'ORDINATEUR INDIVIDUEL

# MGA 64-Bit Power Graphics

PC Computing HARDWARE 200 1994 FINALIST

## The New Standard in Graphics Acceleration

### Proven Performance

Matrox took the lead in high performance graphics by introducing MGA - the very first 64-bit graphics accelerator for the PC. One year later, the competition is still trying to catch up. Why wait for their 64-bit promises? Whether you work in Windows, multimedia or CAD, Matrox has the proven 64-bit solution for all your graphical needs today!

### Power Windows

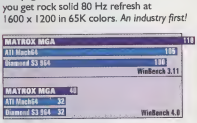
Witness your high resolution graphics scream onto your monitor at over 110 million WinMarks. MGA Ultima's 64-bit graphics technology provides instantaneous redraw speeds of large image files at resolutions as high as 1600 x 1200 in 256 and 65K colors, and 1152 x 882 in 16.7M colors. MGA Ultima is the most powerful accelerator for spreadsheet, page lay-out, illustration and photo retouching applications.

### True Color Acceleration

MGA Ultima is the accelerator of choice when working in true color, according to PC Magazine and Windows Sources. Why? MGA Ultima processes all 16.7 million colors once in VRAM instead of the competition's three 8-bit passes. And MGA Ultima's block-write feature moves entire blocks of pixels instead of only one pixel at a time for 40 million WinMarks of true color power.

### Ultra High Refresh Rates

MGA Ultima offers 120 Hz flicker-free refresh and ultra high resolutions up to 1600 x 1200 for displaying two full tabloid size pages. And with MGA Ultima Plus 200, you get rock solid 80 Hz refresh at 1600 x 1200 in 65K colors. *An industry first!*




### Video Ready Capabilities

MGA Ultima VAFC turns your PC into a low-cost, professional multimedia workstation. By supporting the new industry accepted VESA Advanced Feature Connector (VAFC), MGA Ultima VAFC enables you to add on any VAFC based peripheral for compression and smooth Video-for-Windows playback at 1280 x 1024 at 30 frames per second, as well as frame capture boards and video encoders like the MGA Video PRO.

### Windows Productivity Features

MGA Ultima's feature-rich control panel offers:

- **Instant Modeswitch** for on-the-fly resolution and color depth switching without exiting Window. *Another industry first!*
- **Pixel Touch** hardware pan and zoom
- **QCDP** true color simulation in 8 and 16-bit modes at resolutions up to 1600 x 1200
- **Virtual Desktop** sizes up to 1600 x 1200
- **VideoView** full screen Video-for-Windows playback
- **DPMS** automatic monitor power down

### DynaView™ 2D CAD

MGA Ultima is bundled with DynaView 2D, Matrox's own powerful display list drivers for AutoCAD offering features such as, Dynamic **Bird's Eye** and **Spy Glass** views, Windows-like **Scroll Bars**, reconfigurable **Iconic Menus** and **Text Windows**. And MGA Ultima's AutoCAD performance under Windows is up to three times faster than the competition's. Dual display drivers are also available for MicroStation.

### Power Drivers

Matrox's long standing reputation for reliable hardware and solid drivers is one of the reasons why Gateway 2000, Hewlett Packard and Digital are including an MGA in their systems. MGA Ultima provides reliable driver and bus support for:

- Windows 3.1
- OS/2 PM 2.1
- PCI, VL, ISA, MCA
- Windows NT
- Unix X-Windows

MATROX MGA POWER GRAPHICS

| | ATI Mach 64 | Diamond S3 964 |
|---|---|---|
| Maximum 8 and 16-bit resolution | 1600 x 1200 | 1280 x 1024 |
| Maximum24-bit resolution | 1152 x 882 | 1280 x 1024 |
| True color simulation at up to 1600 x 1200 | QCDP™ (Quality Color Dithering Process) | No |
| Maximum 1024 x 768 refresh rate | 120 Hz | 100 Hz |
| On-the-fly resolution and color depth switching | Instant ModeSwitch™ | WinSwitch |
| Support for "Video Ready" industry standards | VAFC (VESA Advanced Feature Connector) | No |
| Full screen Video-for Windows playback | Video View | Yes |
| VIW playback at 1280 x 1024 @ 30 frames/second | MGA Ultima VAFC | Yes |
| Broadcast quality video encoding | MGA Video PRO | No |

Notes: MGA WinMark scores are based on in-house testing of MGA Ultima 2MB PC using ZiffDavis WinBench 4.0 on a P54C, 90 MHz system, 1024 x 768 x 8 bit and 800 x 600 x 24 bit. Comparative information taken from ATI and Diamond's promotional literature

**1-800-361-1408**

**MATFAX: (514) 685-0174**

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$599 2MB PCI/VL

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matrox

Circle 162 on reader service card.

## DECISION MAKER

HOW TO BUY THE BEST **CD-ROM DRIVE** FOR YOUR BUSINESS

**1** Choose the factor most important to you. **2** Choose the next most important factor. **3** What else is important? **4** For your needs, the best product to buy is . . .

| | | | |
|---|---|---|---|
| Performance | Price | Mechanical Design | Chinon CDX-535 |
| | | Ease of Installation | NEC MultiSpin 4XPro |
| | Mechanical Design | Service & Support | NEC MultiSpin 4XPro |
| | | Documentation | NEC MultiSpin 4XPro |
| Service & Support | Price | Mechanical Design | Chinon CDX-535 |
| | | Performance | Chinon CDX-535 |
| | Documentation | Mechanical Design | NEC MultiSpin 4XPro |
| | | Ease of Installation | Toshiba TXM-4101L |
| Mechanical Design | Performance | Ease of Installation | Toshiba TXM-4101L |
| | | Service & Support | Pioneer DRM-1804X |
| | Price | Service & Support | NEC MultiSpin 3Xe |
| | | Documentation | Toshiba TXM-4101L |

PC Best

**CD-ROM Drive**

# NEC MultiSpin 4XPro

**PERFORMANCE:** NEC's MultiSpin 4XPro was the second-fastest drive we clocked—next to the Pioneer DRM-1804X—with very respectable speeds.

**PRICE:** It's definitely not the cheapest at $995, but you won't find a more well-rounded drive.

**DOCUMENTATION:** We found some missing information during installation, but overall NEC's 4XPro is well documented.

**EASE OF INSTALLATION:** As far as CD-ROM drives go, the 4XPro is easy to install. Only a few glitches in the documentation cost us time.

**SERVICE AND SUPPORT:** A perfect 10. NEC backs the 4XPro up with constantly available support.

**NEC MultiSpin 4XPro** / NEC Technologies / (800) 388-8888 / $995
*Circle No. 815 on Reader Service Card*

PHOTOGRAPH BY MARK JOHANN

# Best 200 Storage

## CD-ROM Drives

| Rank | Product | Pros & Cons | Performance 35%* | Pros 20% | Mechanical Design 15% | Documentation 10% | Ease of Installation 10% | Service & Support 10% | Total Score |
|---|---|---|---|---|---|---|---|---|---|
| PC Best 1 | **MultiSpin 4XPro**<br>NEC Technologies<br>(800) 388-8888<br>$995<br>*Reader Service No. 815* | **Pros:** Excellent design, among the fastest drives, low drag on CPU. Both support policies and personnel impressed us.<br>**Cons:** High signal-to-noise ratio. | 9.3 | 8.3 | 9.7 | 9.0 | 8.8 | 10 | **91.5** |
| 2 | **Pioneer DRM-1804X**<br>Pioneer New Media<br>(800) 444-6784<br>$2,495<br>*Reader Service No. 816* | **Pros:** Houses 18 CD platters at once, fast transfers.<br>**Cons:** High price, despite the fact that this jukebox handles 18 CDs. | 9.9 | 7.0 | 9.8 | 8.0 | 8.4 | 9.0 | **88.8** |
| 3 | **Toshiba TXM-4101L ****<br>Toshiba America<br>(714) 457-0777<br>$360; $155 for interface kit<br>*Reader Service No. 818* | **Pros:** Fast file access and transfer—often faster than NEC's 3Xe.<br>**Cons:** Weak performance in Photo CD reads, but other speed times were above average. | 7.1 | 9.3 | 9.5 | 10 | 9.4 | 9.0 | **86.1** |
| 4 | **MultiSpin 3Xe ****<br>NEC Technologies<br>(800) 388-8888<br>$600; $125 for interface kit<br>*Reader Service No. 817* | **Pros:** Excellent design, fastest Photo CD reads (some other speed times weren't as impressive).<br>**Cons:** Slow performance with smaller files. | 7.5 | 8.9 | 9.5 | 9.0 | 8.8 | 10 | **86.1** |
| 5 | **Sony CDU-7811**<br>Sony Electronics<br>(800) 352-7669<br>$529.95<br>*Reader Service No. 819* | **Pros:** Good price.<br>**Cons:** Sluggish performance, a drag on CPU. Performance was consistently subpar in most of our tests. | 7.2 | 9.3 | 9.3 | 10 | 8.6 | 9.0 | **85.4** |
| 6 | **Chinon CDX-535**<br>Chinon America<br>(800) 441-0222<br>$795<br>*Reader Service No. 820* | **Pros:** Low drag on CPU, speedy cached transfers, high signal-to-noise ratio.<br>**Cons:** High price, transfer rate slows with large files in some of our tests. | 7.9 | 8.7 | 9.4 | 8.0 | 8.6 | 9.5 | **85.3** |
| 7 | **Plextor DM-5028**<br>Plextor<br>(800) 886-3935<br>$439<br>*Reader Service No. 821* | **Pros:** Least harmonic distortion, excellent price, strong signal-to-noise ratio.<br>**Cons:** Proprietary SCSI interface required. | 7.6 | 9.5 | 8.8 | 8.5 | 8.6 | 8.0 | **83.9** |
| 8 | **Hitachi CDR6750**<br>Hitachi Home Electronics<br>(800) 448-2244<br>$795<br>*Reader Service No. 822* | **Pros:** Least drag on the CPU. Documentation is well presented.<br>**Cons:** Lackluster transfer rates during speed tests. | 7.6 | 8.7 | 9.3 | 9.0 | 8.6 | 8.0 | **83.6** |

*PERCENTAGES REFLECT THE WEIGHT OF EACH FACTOR IN TOTAL SCORE. FACTORS ARE SCORED ON A SCALE OF 1 TO 10. TOTAL SCORES ARE NORMALIZED TO A SCALE OF 1 TO 100. NOTEWORTHY SCORES ARE HIGHLIGHTED IN RED. ** WHEN TOTAL SCORES TIE, THE MORE AFFORDABLE PRODUCT IS RANKED HIGHER.

## U Usability Close-Up
## No More Slipped Discs

Pioneer's 6- and 18-disc **CD-ROM changers** pour multiple silver platters into your PC—and provide the best alternative to all-thumbs disc swapping. One caveat: There's only one read mechanism, so you can only access the discs individually.

**Jukebox Drives Rule** Say good-bye to the tiresome CD shuffle routine.

## P Performance Spotlight: Throughput

Overall scores for performance (above) are based on throughput, data access, and application speed tests.

PHOTOGRAPH BY ARNOLD TOSELIO

PHOTOGRAPH BY DAVID PERRY

## MATTHEW LAKE **Pioneer DRM-1804X**

The civilized world gave up swapping disks to load programs the day the first hard disks arrived. Then CD-ROMs happened and we traveled back ten years to the days of floppy-swapping: To get at Microsoft Bookshelf, you eject the caddy, take out Dracula Unleashed, plop in Bookshelf, close the caddy, load it, and you're in business. No thanks. Give me 18 discs at once, no fuss, no muss. Give me Pioneer New Media's DRM-1804X. It houses three six-packs of CD-ROMs and takes seconds to slip a new disc into its reading mechanism. It gets at data on a mounted disc in milliseconds flat, then blasts bits across the bus at more than 600 Kbps. OK, so the casing of this leviathan is almost as big as a minitower. I don't care. All I need now is a bigger desk.

# PowerViewer

It's 9:00, Monday morning and you've just learned the horrifying news. That big meeting with the president of the company next week? It's been moved up. Way, way up. And that report for the big meeting? It's due in half an hour. Fortunately, you've got PowerViewer™ for Windows™, the one tool that lets you access virtually any database and create presentation-ready reports with a few simple clicks of the mouse. You take a long sip of coffee, sit down in front of your computer and click open PowerViewer.

## Access More Information.

Click. Quickly, you access the Connect Profile menu and select the database you want. Because PowerViewer supports over 25 of the most popular PC and relational databases, all the information you need is right at your fingertips. And with Powersoft's Database Connection Hotline, you know any questions you have will receive immediate answers. Click. You go into the Report Painter and select the specific data for your report using one of PowerViewer's powerful point-and-click query techniques. You choose the one that suits you best, whether it's our easy-to-use QuickSelect, our powerful graphical query builder, or a query you've saved from a previous task. Click. Now you're ready to create your report. You select one of the many built-in QuickStyle

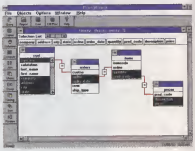
## Create Stunning Reports.

templates that enable you to create stunning reports with full-color 2D and 3D graphs and charts. PowerGuides and Data Smart design tools lead you through every step and let you preview and customize any aspect of your report in seconds. Include a pie chart. Change fonts. Add colors. Pull in your corporate logo. And click, click, click — suddenly, you've created a masterpiece. PowerViewer makes information access as simple as point and click. It empowers you to make full use of your company's information and lets you do it faster and with greater ease than you ever thought possible.

## PowerViewer, Just $99.*

It's 11:00 and you've just come out of the big meeting. Your report was a hit. A big hit. So big, in fact, the president has asked you to run it by the entire company, gather everyone's opinions and give him a report on your findings. Under ordinary circumstances, this would be the kind of news that could ruin your entire month. Fortunately, one of your colleagues has PowerMaker™ for Windows, the tool that gives you all the functionality of PowerViewer plus the power to design fully-interactive forms, manipulate databases and create complete Windows-based applications in no time.

**Click**
**Click**



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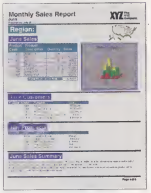

POWERSOFT ENTERPRISE SERIES

* Introductory prices are subject to change without notice. Prices do not include sales tax, shipping or handling.

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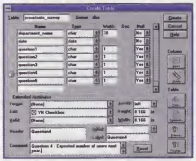

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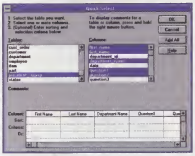

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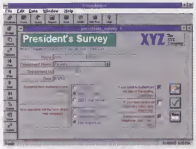
**Done**




# PowerMaker

## Build Applications Too.

Click. You open PowerMaker, access the Connect Profile menu and select a database to capture responses to your employee survey. You can use the powerful WATCOM™ SQL relational database that's included in PowerMaker or select any other database on your network. Then, with the touch of a mouse, you access the Database Painter and PowerMaker guides you painlessly through creating your database layout.

Click. Next, you access the Form Painter. Another touch of the mouse links your database to the survey form you're about to create. Then, just like when you created your report earlier, you simply choose a QuickStyle form template, layout your survey and customize it in seconds. Edit text. Rearrange questions. Add toolbars. Bring in all the bells and whistles. In minutes, you've created your very own Windows application.

## PowerMaker, Just $199.*

Click. Now, it's time to distribute your application to the world. PowerMaker not only enables you to share your applications with everyone on your network; it lets you do it without any user runtime fees. So you just put your "President's Survey" on the network and tell your colleagues it's coming. They simply click open the icon and fill in the blanks. Your database is updated automatically. All you have to do is go in and create your final report. And you already know how easy that's going to be. PowerMaker lets you take the power of PowerViewer a step further, helping you build and distribute your own form-based applications, as well as update databases. With PowerMaker, you can create living, breathing Windows applications that your entire department can use. And you can do it all by yourself in just a few short minutes.

**Circle 214 on reader service card.**

## Call 1-800-273-2841 Today.

Of course, this scenario is merely a reenactment of the typical office crisis. But the fact is, PowerViewer and PowerMaker make accessing the information you need, producing stunning reports, and even creating and distributing your own Windows applications as simple as point and click. And right now, these tools are not only incredibly easy to use. They're also incredibly easy to buy, because we're offering them to you at special prices of just $99 for PowerViewer and $199 for PowerMaker. And each is backed by Powersoft's 30-day satisfaction guarantee. To order PowerViewer and PowerMaker today, simply contact your corporate reseller, stop by CompUSA or call Powersoft directly at **1-800-273-2841.**

**Powersoft**™

Building on the power of people.

Powersoft Corporation
561 Virginia Road, Concord, MA 01742-2732

Best 200

Fast Data, Crystal-Clear Scans and Sounds . . .

# Peripherals

**SYNOPSIS**


**14.4 KBPS FAX MODEMS:** *From speed to performance on bad lines, we found the best.* **224**

**28.8 KBPS MODEMS:** *Our speed tests show true-blue V.Fast Class data transfer.* **228**

**SOUND CARDS:** *Think they're still cause for installation nightmares? Think again.* **232**

**COLOR SCANNERS:** *We evaluated countless image types. One scanner won.* **238**

**EDITOR'S CHOICE:** *If you're an online junkie, here's your product.* **243**


We've saved the best for last. If PCs and printers are the meat and potatoes, then welcome to the dessert cart. We've got the peripherals that let you move information effortlessly from the outside world to your PC and back again. And what a rich assortment! The Internet, faxes, and live video feeds courtesy of high-speed modems. Voice annotations and voice mail thanks to new and improved sound boards. And truly photo-quality images through the magic of 24-bit color scanners.

For instant access to information—anytime, anywhere—a modem is a must. At a minimum, it should conform to the V.32bis modulation standard, transferring data at 14.4 kilobits per second (Kbps), as opposed to last year's 9,600-bps standard. It should also be capable of sending and receiving faxes equally fast.

We found hundreds of 14.4 Kbps modems, all built around the same Rockwell chip. Modem designers can't do much to boost speed, but there's plenty of room for usability breakthroughs. On external modems, look for LCDs that tell you—in plain English—what's happening while you make a connection.

There's fast and then there's V.Fast. Check out the first wave of modems that crank data at 19.2 or even 28.8 Kbps. This class of modems may not be standard until the V.Fast spec is approved this summer, but they're the best way to get sizzling performance in network applications and lifelike videoconferencing.

And in case you haven't heard, the latest generation of sound cards has polished its delivery to a high gloss. This year the focus is on irresistible multimedia presentations, not just games. But with a hodgepodge of software utilities to manage sound, usability is still an issue. We jury-tested to find the silkiest sound.

And then there are color scanners. While 24-bit color currently represents the baseline, it's the quality of bundled scanning software that distinguishes our contenders from one another. Next year, though, we'll probably be looking at 30- and 36-bit scanners—and better prices to go with better color.

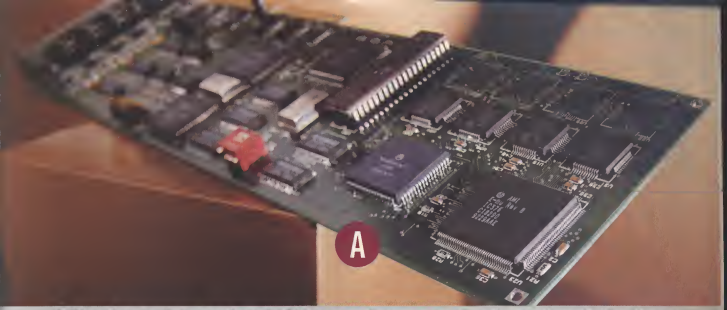
The rule governing peripherals: Make sure that their capabilities are well matched. What you plug in to your computer shouldn't be the weak leg in a relay race that depends on speed. ED BOTT

**A SOUND STRATEGY:** Wave-table chips like the one on **Turtle Beach's MultiSound** sound card store prerecorded instruments for digitized sound instead of the synthesized variety.

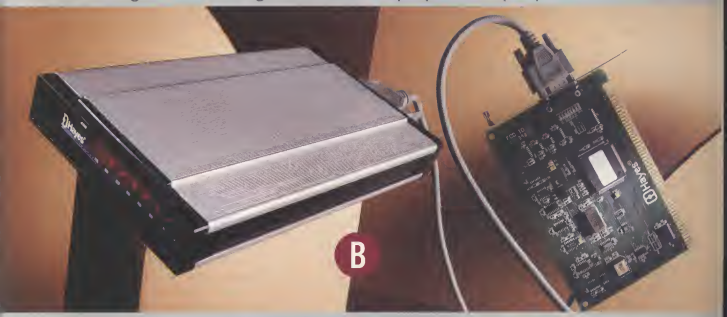
**B SMOOTH SAILING:** The new **Hayes Optima 288 V.Fast Class + Fax** external modem comes with a card that's installed in your PC to buffer data being transmitted at 28.8 Kbps.

**C PERFECT FIT:** Make sure the scanning surface of your color scanner is the right size for your documents—legal-sized papers call for the larger surface of devices like the **AVR 6600/CLX**.

PHOTOGRAPHS BY MARK JOHANN




Offloading a data onslaught? You need superpowered peripherals like these:




64-bit sound cards, V.Fast modems, and color scanners are set to rescue you.

# Top-Notch Data Transfer At a Bottom-Rung Price

Connections are the key to success. And if you're a business computer user, you can't stay connected without a high-speed fax modem. The right modem frees you from the confines of the office and opens up a world of business opportunities. Send faxes directly from your laptop computer anywhere in the world, then quickly search through the past year's computer magazines in seconds. The first decision is already made: Start with a 14.4-kilobit-per-second fax modem. But not all modems were created equal—some can pump data across a phone line faster than you can say "connected at 57.6 Kbps," while some are better able to handle noisy cellular lines.

The best modems can handle anything thrown at them, whether it's remote-control computing or a questionnaire blasted to 1,000 fax machines. When it comes to communication, worrying about a connection is the last thing you want to do. Of course, modems can't overcome a busy signal or hold a connection if the telephone lines go down, but they now transmit faster and much more flawlessly than ever before.

For *PC Computing*'s Best 200, we accepted only external units that transmit and receive both data and faxes at 14.4 Kbps. In addition, we asked for modems with V.42 and V.42bis—two communications protocols that set the standard for error correction and compression. Telecommunications standards, formerly called CCITT standards, theoretically allow a 14.4 Kbps modem to communicate at 57.6 Kbps, though only with compressible files. CCITT, the organization that established these standards, is now known as the International Telecommunications Union—Telecommunications Standards Sector (ITU-TSS).

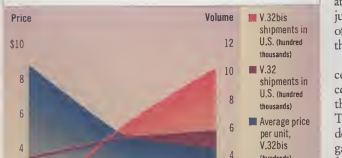
**Factors and Weights** A modem's primary mission is to transfer data fast. Whether it's to curtail the high cost of downloading files from CompuServe or to access e-mail from the road, you want your modem to be quick. That's why performance counts for 35 percent of each product's total score. Next in importance is price—you don't want to pay for more than you get—so it weighs in at 20 percent. Service and support, which takes into account warranty length and the cost and availability of technical support, is 15 percent of the total score. Although there's a good chance you won't read the documentation until well after you've dialed up your first BBS, it's a necessity and amounts to 10 percent of our scoring. Ease of installation is worth looking at on an external modem, although it generally means just hooking up to a serial cable. It counts for 10 percent of the total score. Finally, construction helps determine the life of your modem and is worth 10 percent.

**How We Tested** To test performance, ZD Labs connected each modem to a line simulator from Processing Telecom Technologies. This unit reproduces the connections of the national Public Switched Telephone Network, including the line noise and delays caused by coast-to-coast and satellite calls. To gauge the performance of data throughput, we transferred five files ranging from vector graphics to incompressible files. We then rated throughput based on the weighted average of these tests. This average is what a typical user can expect from these modems.

For fax testing, we faxed a Microsoft Word for Windows business document and a CorelDraw vector image to an identical fax modem. This enabled us to test fax speeds up to 14.4 Kbps, which is not as common on standalone fax machines. Our winning products competed neck and neck. JOHN TASCHEK

**Market Trends: 14.4 Kbps Fax Modems**

1. The New King—V.32bis Modulation
2. Prices to Plummet for V.32bis
3. V.32 Modems to Stay in Use




**No Contest:** Even though prices are now dropping at approximately the same rate, more and more users are opting for V.32bis modulation, as it allows for 14.4 Kbps data transmission. V.32 modems transmit at 9.6 Kbps.

## DECISION MAKER

HOW TO BUY THE BEST **14.4 KBPS FAX MODEM** FOR YOUR BUSINESS

**1** Choose the factor most important to you. **2** Choose the next most important factor. **3** What else is important? **4** For your needs, the best product to buy is . . .

| | | | |
|---|---|---|---|
| Price | Fax Features | Service & Support | AT&T DataPort 14.4 |
| | | Performance | PM14400FXSA |
| | Data Handling | Service & Support | AT&T DataPort 14.4 |
| | | Performance | TurboModem Plus External |
| Performance | Fax Features | Service & Support | AT&T DataPort 14.4 |
| | | Price | U.S. Robotics Sportster |
| | Data Handling | Service & Support | PM14400FXSA |
| | | Price | TurboModem Plus External |
| Service & Support | Fax Features | Performance | AT&T DataPort 14.4 |
| | | Price | AT&T DataPort 14.4 |
| | Data Handling | Price | AT&T DataPort 14.4 |
| | | Performance | PM14400FXSA |

PC Best

### 14.4 Kbps Fax Modem

# AT&T DataPort 14.4

**PERFORMANCE:** While AT&T Paradyne's DataPort 14.4 Data/Fax Modem finished behind others in overall performance tests, it kept data flowing smoothest over a noisy line.

**PRICE:** At $259, the DataPort isn't cheapest, but you get superior error handling and great fax features.

**SERVICE AND SUPPORT:** AT&T is one of only a few vendors to offer toll-free phone support.

**DOCUMENTATION:** The DataPort is missing a quick-reference card, but not much else.

**EASE OF INSTALLATION:** A few missing indicators—such as a test indicator—kept AT&T's modem from shining here.

**DataPort 14.4 Data/Fax Modem** / AT&T Paradyne / (800) 482-3333 / (813) 530-2000 / $259
*Circle No. 831 on Reader Service Card*

PHOTOGRAPH BY MARK JOVANN

# Best 200 Peripherals

## 14.4 Kbps Fax Modems

| Rank | Product | Pros & Cons | Performance 35%* | Price 20% | Service & Support 15% | Documentation 10% | Ease of Installation 10% | Construction 10% | Total Score |
|---|---|---|---|---|---|---|---|---|---|
| Best 1 | **DataPort 14.4**<br>AT&T Paradyne<br>(800) 482-3333<br>$269<br>*Reader Service No. 831* | **Pros:** Best of class, superior error-handling capabilities, great faxing, excellent support policies.<br>**Cons:** No LCD. | 9.1 | 9.0 | 10 | 9.4 | 8.8 | 9.2 | **92.3** |
| 2 | **PM14400FXSA**<br>Practical Peripherals<br>(800) 442-4774<br>$549<br>*Reader Service No. 832* | **Pros:** Fastest data transfer rate, classy LCD, easy to install, great documentation.<br>**Cons:** Expensive, large. | 10 | 7.0 | 8.5 | 10 | 10 | 9.6 | **91.4** |
| 3 | **TurboModem Plus**<br>Complete PC<br>(407) 997-9683<br>$229<br>*Reader Service No. 833* | **Pros:** Great performer at a good price.<br>**Cons:** Could have better service and support. | 9.4 | 9.4 | 8.5 | 9.1 | 8.8 | 8.7 | **91.1** |
| 4 | **14.4 Kbps External ****<br>Boca Research<br>(407) 997-6227<br>$245<br>*Reader Service No. 834* | **Pros:** Solid performer in our speed tests, good price.<br>**Cons:** A notch below most in construction. | 9.3 | 9.2 | 8.5 | 9.1 | 8.8 | 8.7 | **90.3** |
| 5 | **U-1496E ****<br>ZyXel<br>(800) 255-4101<br>$349<br>*Reader Service No. 835* | **Pros:** Fast transfer rate when connected to another ZyXel modem.<br>**Cons:** Pricey, poor fax performance. | 9.8 | 7.7 | 8.5 | 9.1 | 9.4 | 9.3 | **90.3** |
| 6 | **Zoom VFX V.32bis**<br>Zoom Telephonics<br>(800) 666-6191<br>$199<br>*Reader Service No. 836* | **Pros:** Great price with impressive performance.<br>**Cons:** Mediocre support policies and only passable documentation. | 9.1 | 9.9 | 7.6 | 8.2 | 9.4 | 8.4 | **89.1** |
| 7 | **Sportster 14.4 Fax**<br>U.S. Robotics<br>(800) 342-5877<br>$249<br>*Reader Service No. 837* | **Pros:** Great data transfer rate in our primary tests, great documentation.<br>**Cons:** Fax throughput is too slow. | 9.0 | 9.1 | 8.5 | 10 | 7.6 | 8.9 | **89.0** |
| 8 | **SupraFaxModem**<br>Supra Corp.<br>(800) 727-8772<br>$249.95<br>*Reader Service No. 838* | **Pros:** Solid construction, great documentation.<br>**Cons:** Could be easier to install (required more setup time than others). | 8.8 | 9.1 | 8.5 | 10 | 7.0 | 9.8 | **88.6** |
| 9 | **Faxmodem 144/144e**<br>Intel<br>(800) 538-3373<br>$249<br>*Reader Service No. 839* | **Pros:** Good data transmission performer at a good price.<br>**Cons:** Slowest fax speed of test bed. | 8.4 | 9.1 | 9.0 | 9.1 | 9.4 | 8.8 | **88.4** |
| 10 | **Optima 144 + Fax 144**<br>Hayes Microcomputer<br>(800) 964-2937<br>$579<br>*Reader Service No. 840* | **Pros:** Great support, great documentation, best construction.<br>**Cons:** Slow on data transfer and fax speed. | 7.9 | 7.2 | 9.5 | 10 | 9.4 | 10 | **85.7** |

*PERCENTAGES REFLECT THE WEIGHT OF EACH FACTOR IN TOTAL SCORE. FACTORS ARE SCORED ON A SCALE OF 1 TO 10. TOTAL SCORES ARE NORMALIZED TO A SCALE OF 1 TO 100. NOTEWORTHY SCORES ARE HIGHLIGHTED IN RED. **IN THE EVENT OF A TIE IN TOTAL SCORES, THE MORE AFFORDABLE PRODUCT IS RANKED HIGHER

## Usability Close-Up
## The World's Chattiest Modem

Practical Peripherals' **PM14400FXSA,** our overall performance winner, includes a smart 12-character backlit LCD that talks back—in English! Want to know how fast you're connecting, or if you're using compression? Take a look.

**Modemspeak** Who says modems can't talk? This one's as gabby as they get.

## Performance Spotlight: Data Transfer

Overall scores for performance (above) are based on data transfer and fax performance.

PHOTOGRAPH BY ARNOLD TOSKEJO

*Toshiba discovers the secret to longer life. The ultra-lightweight Li-Ion battery, with up to 8 hours of battery life, is the ultimate in power-per-ounce.*

intel inside

# THE SHAPE OF THINGS TO GO.™

*The new AccuPoint™ isometric pointing device works in conjunction with click and drag buttons located comfortably beneath the thumbs.*

**PORTÉGÉ**

**T3400**
- 8.4" STN monochrome display
- 7.9" x 9.9" x 1.7"
- 4.1 lbs.

**T3400CT**
- 7.8" color TFT-LCD active matrix display—256 color SVGA
- 7.9" x 9.9" x 1.8"
- 4.4 lbs.

**Both Models**
- 33MHz SL Enhanced i486™SX
- 120MB HD
- 4MB RAM (expandable to 20MB)
- Lithium-Ion battery
- Type II (5mm) PCMCIA slot
- AccuPoint™ integrated pointing device
- Integrated BitBLT graphics accelerator
- VL local-bus video
- Ports: serial, parallel, FDD, Port Replicator, and VGA adapter
- Windows™, DOS™, CommWorks™ for Windows

3 YEAR LIMITED WARRANTY

## INTRODUCING THE NEW ULTRAPORTABLE PORTÉGÉ.

Toshiba engineers have just reinvented the portable computer. The Portégé™ T3400 Series perfectly balances mass and speed. Now you can travel with a system smaller than a notebook, yet graced with the feel of a full-size system; driven by the full force of an i486™ SX/33 processor. And come home to the optional Port Replicator for simple, single-point connection to your complete desktop environment. See how far Toshiba has taken every aspect of portable computing. And think where it can take you. **Call 1-800-457-7777 for the dealer nearest you.**

In Touch with Tomorrow

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**Circle 215 on reader service card.**

# Data Trafficking Woes? Here Come the Solutions

Time is money—at least in the eyes of the phone company. The good news: The newest breed of fax modems can take some of the bite out of your phone bill in nothing flat. These modems communicate at 28.8 kilobits per second (Kbps) and achieve transfer times of 115.2 Kbps or more, letting you access your remote office at near LAN speeds. Our top performers competed fiercely with each other.

V.Fast Class modems aren't part of a standard—yet. In the coming months, the ITU-TSS (formerly the CCITT) will set in stone an international telecommunications standard called V.34, or V.Fast, that allows for modem communications at 28.8 Kbps. But don't be too concerned about the 28.8 Kbps modem you buy today becoming obsolete anytime soon. The manufacturers of the units we tested say that their modems will be able to communicate at high speeds with V.34 modems. And each manufacturer will offer a low-cost, easy-to-install upgrade to the new standard. If you're uncomfortable installing the upgrade yourself, most vendors will do it for you at a minimal charge. The bottom line: If you need a high-speed modem, now's the time to get one. These modems are more than toys—they're for real.

We asked each vendor to send us its best V.Fast Class modem. We accepted external units only, but they could be pocket-sized portables or full-featured desktop modems. All of the modems include V.42 for error correction and V.42bis to achieve faster transfer rates through data compression. We checked—and scored highly for in the features and technology factor—MNP-10 compatibility, which has mechanisms that handle cellular connections and poor lines.

**Factors and Weights** The factors for high-speed V.Fast Class modems differ slightly from those we use for 14.4 Kbps modems. We separate data performance from fax performance because the former is of primary importance when purchasing a high-speed modem. Data performance weighs in at 30 percent of the total score. Fax performance is less important because there are few 28.8 Kbps fax machines in today's offices, and buyers can get the same performance from a less expensive modem. Therefore, fax performance makes up 15 percent of the total score. Price is always important, and also accounts for 15 percent. We weight features and technology at 15 percent because many new features actually help the performance of these modems. This factor takes into account everything included with each modem, ranging from parallel-port support to LCD panels.

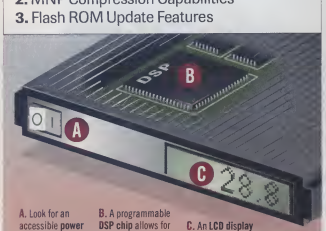
Service and support accounts for 10 percent. To determine this score, we checked everything from the length of the modem's warranty to whether or not its manufacturer offers toll-free support. Construction, including design and integrity, is 10 percent, and documentation weighs in at 5 percent.

**How We Tested** ZD Labs connected each modem to a Processing Telecom Technologies line simulator. To gauge data throughput, we transferred five files ranging from vector graphics to incompressible files. We then ran the test twice more, once using alternative (I/O) devices—such as a parallel port or enhanced serial card—on modems that had them, and once using tests that simulate 95 percent of the nation's phone network. For fax testing, we ran the same tests as we did for the 14.4 Kbps modems, but this time faxed modem to modem at 28.8 Kbps and modem to fax machine at 14.4 Kbps.

JOHN TASCHEK

## Technical Checkpoints: 28.8 Kbps Modems

1. Support for V.17 or CAS Fax Standards
2. MNP Compression Capabilities
3. Flash ROM Update Features




**A.** Look for an accessible **power switch**, preferably up front.

**B.** A programmable **DSP chip** allows for easy software upgrades.

**C.** An **LCD display** gives very detailed information.

**Standard Issue:** The ITU-TSS's V.17 baseline standard ensures that your modem will be able to send faxes to any fax machine in the world. The Intel/DCA standard governs fax communication between modems and fax boards.

## DECISION MAKER

HOW TO BUY THE BEST **28.8 KBPS FAX MODEM** FOR YOUR BUSINESS

| 1 Choose the factor most important to you. | 2 Choose the next most important factor. | 3 What else is important? | 4 For your needs, the best product to buy is . . . |
|---|---|---|---|
| Data Performance | Features & Technology | Price | Microcom DeskPorte Fast |
| | | Fax Features | Hayes Optima 288 |
| | Fax Performance | Features & Technology | Hayes Optima 288 |
| | | Price | PC288MT |
| Fax Performance | Features & Technology | Price | SupraFaxModem 288 |
| | | Data Performance | Hayes Optima 288 |
| | Data Performance | Features & Technology | Hayes Optima 288 |
| | | Price | SupraFaxModem 288 |
| Price | Features & Technology | Data Performance | SupraFaxModem 288 |
| | | Fax Features | SupraFaxModem 288 |
| | Performance | Data Handling | SupraFaxModem 288 |
| | | Fax Features | SupraFaxModem 288 |

PC Best

### 28.8 Kbps Fax Modem

## SupraFaxModem 288

**DATA PERFORMANCE:** While the SupraFaxModem wasn't fastest overall, it flew in a phone network simulation test.

**FAX PERFORMANCE:** Hayes's Optima won here, but the SupraFaxModem is still a star.

**PRICE:** It matches Hayes's Optima and Microcom's DeskPorte Fast nearly feature for feature—and it costs less.

**FEATURES AND TECHNOLOGY:** Bonus features on this modem include great Windows-based software and a nice LCD.

**SERVICE AND SUPPORT:** A five-year warranty clinches it—the SupraFaxModem gets our nod.




PHOTOGRAPH BY MARK JOHANN

**SupraFaxModem 288** / Supra Corp. / (800) 727-8772 / (503) 967-2400 / $389
*Circle No. 841 on Reader Service Card*

# Best 200 Peripherals

## 28.8 Kbps Fax Modems

| Rank | Product | Pros & Cons | Data Performance 30%* | Fax Performance 15% | Price 15% | Features & Technology 15% | Service & Support 10% | Satisfaction 10% | Documentation 5% | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|
| PC Best 1 | **SupraFaxModem 288**<br>Supra Corp.<br>(800) 727-8772<br>$399<br>*Reader Service No. 841* | **Pros:** Great bundle with bargain price—our winner was a favorite with testers. **Cons:** Needs better performance to match the otherwise top-notch feature set. | 8.5 | 8.9 | 9.3 | 9.4 | 8.9 | 8.3 | 10 | **89.1** |
| 2 | **DeskPorte Fast ****<br>Microcom<br>(800) 822-8224<br>$499<br>*Reader Service No. 842* | **Pros:** Excellent design, earns a perfect score in our technology evaluation. **Cons:** Poor fax implementation drops it from first place, though data transfer was fast. | 9.4 | 7.0 | 8.0 | 10 | 8.9 | 9.5 | 9.6 | **88.9** |
| 3 | **Optima 288 V.FC Data + Fax ****<br>Hayes Microcomputer Products<br>(800) 964-2937<br>$579<br>*Reader Service No. 843* | **Pros:** Best all-around performer. If you need top fax capabilities, this is the high-speed modem for you. **Cons:** Most expensive, support shortcomings, poor documentation. | 9.9 | 10 | 7.0 | 8.8 | 7.6 | 9.4 | 7.0 | **88.9** |
| 4 | **PC288LCD**<br>Practical Peripherals<br>(800) 442-4774<br>$529<br>*Reader Service No. 844* | **Pros:** A first-class LCD puts the others to shame. **Cons:** Large form factor and footprint, fax and data performance were mediocre. | 8.7 | 8.7 | 7.7 | 9.5 | 9.5 | 8.4 | 10 | **87.9** |
| 5 | **PC288MT**<br>Practical Peripherals<br>(800) 442-4774<br>$459<br>*Reader Service No. 845* | **Pros:** All-around solid performer with a lifetime warranty. **Cons:** Utilitarian design not very flashy, below-average documentation had numerous holes. | 9.0 | 9.0 | 8.6 | 8.3 | 9.5 | 8.2 | 8.1 | **87.6** |
| 6 | **PM288PKT**<br>Practical Peripherals<br>(800) 442-4774<br>$499<br>*Reader Service No. 846* | **Pros:** A high-speed road warrior, excellent feature set. **Cons:** Big price for this little box, fax performance was mediocre. | 9.0 | 8.7 | 8.0 | 8.8 | 9.5 | 8.6 | 8.1 | **87.4** |
| 7 | **V.Fast Class External BocaModem**<br>Boca Research<br>(407) 997-6227<br>$445<br>*Reader Service No. 847* | **Pros:** Nice software bundle, good set of features. **Cons:** Middling performance on both our data transfer and fax speed tests. | 8.1 | 8.9 | 8.7 | 9.5 | 7.6 | 8.8 | 8.9 | **85.8** |

*PERCENTAGES REFLECT THE WEIGHT OF EACH FACTOR IN TOTAL SCORE. FACTORS ARE SCORED ON A SCALE OF 1 TO 10. TOTAL SCORES ARE NORMALIZED TO A SCALE OF 1 TO 100. NOTEWORTHY SCORES ARE HIGHLIGHTED IN RED. **IN THE EVENT OF A TIE IN TOTAL SCORES, THE MORE AFFORDABLE PRODUCT IS RANKED HIGHER.

### Usability Close-Up
### V.Fast Class Simplicity

The front-panel controls and LCD on Microcom's **DeskPorte Fast** outshine any we've seen. Read messages in plain English without having to decipher LEDs. LCDs offer another advantage—more trouble-shooting messages.

**Take Your Pick** Controls and LCDs distinguish the DeskPorte Fast.

### Performance Spotlight: Data Transfer

Data performance scores (above) are based on several data transfer tests.

PHOTOGRAPH BY ARNOLD TIDSELIO

# We Scan Corrected.

You expect a scanned image to accurately reflect the color found in your original. Getting there, however, is usually no picnic. After scanning, precious hours are often spent adjusting the image in software to capture the truest blue, a faithful fuchsia, or for example, just the right kind of red in a ripe watermelon. But DCR™ has changed all that.

Now, when you purchase the **new, low-priced ScanMaker® IISP single-pass color scanner**, you also get **DCR, Dynamic Color Rendition**, an advanced, yet easy-to-use color calibration and correction system. DCR actually calibrates the ScanMaker IISP to a photographic industry-accepted calibration target, creating a custom color profile of your specific scanner, ensuring the most accurate color possible as you scan the image. But don't take our word for it. Here's what *PC Magazine* said in their February 8, 1994 issue: "...this mechanism (DCR) seems to have worked well, because the ScanMaker IISP's color output was clearly the best of any scanner in our survey."

So, even if you need to capture the bright yellow flesh of a Honeyheart watermelon, like the wedge on the left, the quickest way to do it is with the new ScanMaker IISP with DCR.

For more information about the ScanMaker IISP, DCR, your nearest authorized Microtek reseller, or a FREE copy of *The Scanned Image* — a scanning primer, call **1-800-654-4160** or fax (310) 297-5050.

*The ScanMaker IISP accurately captures millions of brilliant colors at resolutions up to 1200 x 1200 dpi through software interpolation (300 x 600 dpi optically). In addition to the DCR color calibration/correction system, the ScanMaker IISP is bundled with* ***Adobe Photoshop 2.5 LE*** *for either Windows or Macintosh. Windows users also get* ***Caere's PageKeeper Portfolio*** *document and image management software.*

PC MAGAZINE EDITORS' CHOICE
February 8, 1994
Microtek ScanMaker IISP

IMAGING MAGAZINE EDITORS' CHOICE

**Get a hands-on demonstration of the ScanMaker IISP with DCR and find out more about accurate color scanning by attending Focus Seminars' *"ColorRight, Color Correction & Reproduction Workshop."* For dates and locations, call Microtek at 1-800-654-4160.**

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*Better Images Through Innovation.*

The DCR color calibration / correction system is a proprietary system of Microtek Lab, Inc. The following are trademarks or registered trademarks of their respective companies: Microtek, ScanMaker and DCR (Dynamic Color Rendition) of Microtek Lab, Inc. Adobe Photoshop LE of Adobe Systems, Inc. PageKeeper Portfolio of Caere Corporation. SMIISP294

**Circle 185 on reader service card.**

# Desktop Concert Halls: Just Let Your Ears Decide

Listen up: PC audio is finally hitting a crescendo. Say good-bye to wimpy warbles and hello to the kind of sound that mainline multimedia was meant for. While yesterday's 8-bit boards were pigeonholed as gamers' toys, the new crop of 16-bit units won't embarrass you. Our top scorers competed closely.

Thanks to widely accepted standards, high-end sound boards are running a tight race. The boards we tested were closely matched in nearly every category we scored. For our tests, we chose boards designed and targeted for multimedia presentations. We looked for 16-bit record-and-playback capabilities, software upgradability so these boards won't be obsolete any time soon, and efficient sound processing that bypasses the CPU. We preferred onboard digital signal processors (DSPs). We also looked for wave-table synthesis, lifelike MIDI sound, and Windows-based mixers.

**Factors and Weights** We scored the sound cards on several fronts, but the bottom line is this: How do they sound? The most important factor is digitized sound quality, which accounts for 25 percent of the final score. Bundled software is weighted at 20 percent of each product's total score.

Last year we gnashed our teeth testing installation. In fact, it took us anywhere from 30 minutes to a whole day to install and configure those boards. Ease of installation, which averaged an amazingly quick 15 minutes per board this year, amounts to 15 percent of the final score. We were impressed.

These units range in price from about $200 to $600, but twice the cost doesn't necessarily mean twice the quality. Price is weighted at 10 percent of the final score. Service and support also accounts for 10 percent. We evaluated warranty terms and how long we had to stay on hold with the customer-support hot line. Other features we took into consideration: Bundled hardware, which sometimes includes headphones, cables, and microphones, accounts for 10 percent; documentation comprises 5 percent; and the ability to play music (WAV, MIDI, and regular audio CDs) is weighted at 5 percent. Because bundled software, bundled hardware, and digitized sound quality really contribute to the overall usability of a board, usability is one of the starting points on our Decision Maker (see page 235).

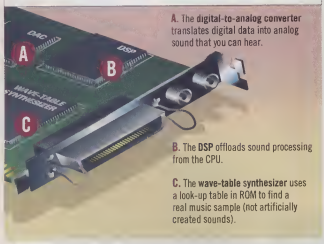
**How We Tested** ZD Labs installed the boards on a 33MHz Slimline SP433 486DX system from Northgate Computer Systems with 8MB of RAM, running MS-DOS 6 and Windows 3.1. We used an Audio Precision System One sound analyzer to monitor and analyze audio signals—although the ear is the best judge and the one we relied on most.

Before testing, each sound card was configured to perform at its best. We ran an analog-to-digital and digital-to-analog test to exercise the circuitry at 8-bit 11kHz stereo and at 16-bit 44kHz stereo. In testing MIDI capabilities, we evaluated each MIDI patch (such as guitar or electric piano) for true-to-life sound quality and ambient circuit noise. We also tested for total harmonic distortion, which is an indication of how well a sound system retains the integrity of the original audio signal. Bundled software comprises a significant part of our final scores because editors, mixers, and other software extras cost $50 to $300 when bought separately. These can make a big usability difference. Above all, we ran jury tests to ensure that the best tool for evaluating sound quality—the ear—presided over our judgments. Our top scorers are all worthy maestros.

YAEL LI-RON

## Technical Checkpoints: Sound Cards

1. SCSI Port for CD-ROM Connection
2. Sound Blaster Compatibility
3. Flexible Interrupt Settings




**A.** The **digital-to-analog converter** translates digital data into analog sound that you can hear.

**B.** The **DSP** offloads sound processing from the CPU.

**C.** The **wave-table synthesizer** uses a look-up table in ROM to find a real music sample (not artificially created sounds).

**Music to Your Ears:** Real advancements here—no more FM synthesis creating sounds, now they play the real McCoy. Also, look for reprogrammable DSPs that let you upgrade to new software without buying a new board.

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**Circle 102 on reader service card.**

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| Backup Exec delivers the only complete NetWare data protection solution. | | | |
|---|---|---|---|
| Features | Backup Exec for NetWare | Cheyenne ARCserve® 4.x | Cheyenne ARCserve® 5.x |
| Novell "Tested and Approved!" for NetWare 3.x and 4.x | YES | NO | NO |
| Complete server-based and workstation-based administration | YES | NO | NO |
| Automatically installs all Novell's SMS components | YES | NO | NO |
| Restores individual objects and containers in the NetWare Directory | YES | NO | NO |

yes NetWare Tested and Approved

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Circle 104 on reader service card.

## DECISION MAKER

HOW TO BUY THE BEST **SOUND CARD** FOR YOUR BUSINESS

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|---|---|---|---|
| Digitized Sound Quality | Bundled Software | Ease of Installation | Turtle Beach MultiSound |
| | | Price | Best Data Soniq Sound |
| | Price | Ease of Installation | Turtle Beach MultiSound |
| | | Bundled Software | Sound Blaster |
| Usability | Bundled Software | Digitized Sound Quality | Sound Blaster |
| | | Ease of Installation | Sound Blaster |
| | Digitized Sound Quality | Price | Best Data Soniq Sound |
| | | Bundled Software | Sound Blaster |
| Price | Digitized Sound Quality | Bundled Software | Best Data Soniq Sound |
| | | Service & Support | IBM Audiovation (ISA) |
| | Bundled Software | Digitized Sound Quality | Best Data Soniq Sound |
| | | Service & Support | IBM Audiovation (ISA) |

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## DECISION MAKER HOW TO BUY THE BEST SOUND CARD FOR YOUR BUSINESS

| 1 Choose the factor most important to you. | 2 Choose the next most important factor. | 3 What else is important? | 4 For your needs, the best product to buy is . . . |
|---|---|---|---|
| Digitized Sound Quality | Bundled Software | Ease of Installation | Turtle Beach MultiSound |
| | | Price | Best Data Soniq Sound |
| | Price | Ease of Installation | Turtle Beach MultiSound |
| | | Bundled Software | Sound Blaster |
| Usability | Bundled Software | Digitized Sound Quality | Sound Blaster |
| | | Ease of Installation | Sound Blaster |
| | Digitized Sound Quality | Price | Best Data Soniq Sound |
| | | Bundled Software | Sound Blaster |
| Price | Digitized Sound Quality | Bundled Software | Best Data Soniq Sound |
| | | Service & Support | IBM Audiovation (ISA) |
| | Bundled Software | Digitized Sound Quality | Best Data Soniq Sound |
| | | Service & Support | IBM Audiovation (ISA) |

PC Best

**Sound Card**

# Sound Blaster 16 SCSI-2 ASP

**DIGITIZED SOUND QUALITY:** Creative Labs' Sound Blaster board was one of the best in our evaluation of MIDI patches.

**BUNDLED SOFTWARE:** With ten high-quality programs bundled, Creative Labs has a complete package.

**EASE OF INSTALLATION:** Ever spent a day installing a card? We have—the Sound Blaster took minutes.

**PRICE:** $579 isn't the cheapest, but you get what you pay for.

**SERVICE AND SUPPORT:** Some improvements are needed—a two-year warranty (it's one year now) and a toll-free support line are on our wish list.

**Sound Blaster 16 SCSI-2 ASP** / Creative Labs / (800) 998-5227 / (408) 428-6600 / $579
*Circle No. 848 on Reader Service Card*

PHOTOGRAPH BY MARK JOHANN

# Best 200 Peripherals

## Sound Cards

| Rank | Product | Pros & Cons | Digitized Sound Quality 25%* | Bundled Software 20% | Ease of Installation 15% | Price 10% | Service & Support 10% | Bundled Hardware 10% | Documentation 5% | Ability to Play Music 5% | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Best 1 | **Sound Blaster 16 SCSI-2 ASP**<br>Creative Labs<br>(800) 998-5227<br>$579<br>*Reader Service No. 848* | **Pros:** Excellent MIDI quality, impressive collection of bundled software.<br>**Cons:** Wave-table daughterboard may take up expansion slot space. | 9.5 | 10 | 9.5 | 8.6 | 8.5 | 9.0 | 9.8 | 9.5 | **93.8** |
| 2 | **MultiSound**<br>Turtle Beach Systems<br>(800) 645-5640<br>$499<br>*Reader Service No. 849* | **Pros:** Excellent audio quality, very fast WAV front end.<br>**Cons:** No MIDI sequencing front end. | 9.8 | 9.5 | 9.5 | 9.0 | 9.0 | 8.0 | 9.1 | 9.5 | **93.1** |
| 3 | **Soniq Sound ****<br>Best Data Products<br>(800) 632-2378<br>$259<br>*Reader Service No. 850* | **Pros:** Excellent MIDI patch set, best overall audio quality.<br>**Cons:** No bundled hardware, failed to connect to MIDI keyboard. | 9.9 | 9.6 | 9.1 | 9.8 | 9.0 | 6.0 | 9.1 | 9.5 | **91.7** |
| 4 | **SonicSound**<br>Diamond Computer Systems<br>(408) 736-2000<br>$299<br>*Reader Service No. 851* | **Pros:** Nice array of bundled software.<br>**Cons:** Audio quality lagged behind top scorers in our jury tests, although it wasn't the worst. | 8.1 | 9.6 | 9.5 | 9.5 | 9.5 | 9.0 | 9.7 | 9.5 | **91.3** |
| 5 | **Audiovation (ISA)**<br>IBM<br>(800) 426-2968<br>$205<br>*Reader Service No. 852* | **Pros:** Complete package, including all of the necessary accessories.<br>**Cons:** Bundled software is somewhat lacking. | 8.5 | 8.8 | 9.0 | 9.5 | 9.5 | 10 | 9.1 | 9.5 | **90.7** |
| 6 | **DSP 16 Plus**<br>MediaMagic<br>(800) 624-8654<br>$259<br>*Reader Service No. 853* | **Pros:** Nice array of bundled software.<br>**Cons:** Lacked true-to-life sound in our MIDI tests. | 8.1 | 9.6 | 9.5 | 9.8 | 9.5 | 8.0 | 9.5 | 9.5 | **90.5** |
| 7 | **Digital Sound Pro 16 Plus with Wavetable**<br>Cardinal Technologies<br>(800) 775-0899<br>$229<br>*Reader Service No. 854* | **Pros:** Impressive collection of bundled software.<br>**Cons:** Mediocre MIDI quality. | 7.8 | 9.6 | 9.1 | 10 | 9.0 | 8.0 | 9.4 | 8.0 | **88.1** |
| 8 | **RAP-10**<br>Roland Corp.<br>(213) 685-5141<br>$599<br>*Reader Service No. 855* | **Pros:** Excellent MIDI patch set, impressive collection of bundled software.<br>**Cons:** Poor 16-bit stereo sound quality, no SCSI connection. | 7.0 | 9.8 | 9.5 | 8.5 | 8.8 | 8.0 | 8.0 | 9.5 | **85.4** |

*PERCENTAGES REFLECT THE WEIGHT OF EACH FACTOR IN TOTAL SCORE. FACTORS ARE SCORED ON A SCALE OF 1 TO 10. TOTAL SCORES ARE NORMALIZED TO A SCALE OF 1 TO 100. NOTEWORTHY SCORES ARE HIGHLIGHTED IN RED. ** LATE PRERELEASE VERSION.

## Usability Close-Up: Sounds You Control

Roland's bundled **Audio Tools** software features all of the controls you need to play audio CDs and WAV and MIDI files. It's got a smooth interface. It looks and feels like a regular stereo system, so the learning curve is very slight.

Is It Live? Audio Tools' software controls conjure up perfect sound.

## Performance Spotlight: Record/Playback

This test times record/playback for one minute of sound; load and save times vary.

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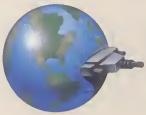

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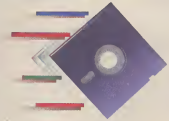

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**Circle 152 on reader service card.**

# Original or Counterfeit? Good Scans Can Fool You

If you're thinking scanners, think color. The difference in the price of a general-purpose color flatbed scanner and its grayscale counterpart is small enough to make the color models excellent buys. What's more, with the crop of scanners that made it past *PC Computing*'s finishing post, the clear optics, sharp resolutions, and distinct gradations of color and grayscale are a boon for any business use. From OCR and document image management to presentation and prepress chores, you'll find it all here.

To make it into the paddock for this year's contest, scanners had to be flatbed models capable of reading in 16 million colors (24 bits per pixel) at true horizontal resolutions of 300 to 400 dots per inch. We found many variations on the resolution theme, because manufacturers often manage to get higher true resolution on the vertical axis, then use software-based interpolation to bump up the pixel count on the horizontal axis. Because horizontal resolution is the limiting factor, and even the best interpolation needs a lot of original data to do a good job, we used it as a qualification. We also remained dogged in our insistence on TWAIN compliance, because it enables you to control your scanner from the greatest number of Windows applications.

**Factors and Weights** In scanning, nothing is as important as the end result, so we assigned 30 percent of each scanner's total score to image quality, which includes the fidelity and intensity of color and grayscale images, their sharpness, and the quality of highlights and shadows. Next most important is price, at 20 percent. Over the past two years, prices for color flatbed and grayscale scanners have dropped to within $500 of each other, with cut-throat pricing knocking out smaller and less-committed players.

As with any piece of hardware, mechanical design is a key factor, weighing in at 15 percent in our evaluation. We factored in scanning speed and energy-conscious features such as overall power consumption and lights that power on only during scans. In addition, we looked at the capability and ease of upgrading the scanner with transparency units and multiple-document feeders. Scanning controls and image editing software are equally important, with a 10 percent weighting each. While large numbers of scanning controls—previewing, zooming, resolution selection, and prescan corrections—counted for a lot, the OCR software that made the process easy also gained bonus points. Once you have a scan, being able to manipulate it with software is always important.

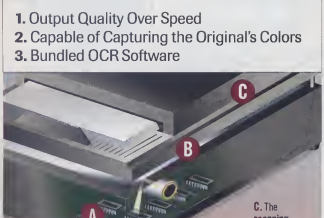
We also rated documentation, ease of installation, and service and support at 5 percent each.

**How We Tested** Using each scanner's TWAIN scanning source, ZD Labs scanned identical grayscale and color images and timed the duration of each scan. Using three sets of scan times, we calculated the rate at which each scanner transferred data to the PC. We then printed the scans using a Tektronix Phaser IISD dye-sublimation printer. A panel sight-tested the images for intensity, clarity, highlights, shadows, and overall fidelity compared to the originals. Finally, we rated the optical clarity and quality of software interpolation using a line-art "real-resolution" test. By scanning a black-and-white photograph of converging lines, zooming in on a portion of it using the included software, and printing the results, we were able to judge very easily how clearly the scanners see. In scanning, the eyes have it.

MATTHEW LAKE

## Technical Checkpoints: Color Scanners

1. Output Quality Over Speed
2. Capable of Capturing the Original's Colors
3. Bundled OCR Software




A. Check the resolution that comes from the **charge-coupled devices** (CCDs)—400 dpi is best.

B. The best designs let you easily snap on a **document feeder** or other option.

C. The **scanning surface** must be big enough (legal/letter) to handle the materials you plan to scan.

**Avoid the Pass Play:** Look at output quality first. Concerns about vast differences in speed with triple-pass as opposed to single-pass scanners are overblown. Both technologies are fast. It all depends on the product.

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| 1 | 2 | 3 | 4 |
|---|---|---|---|
| Image Quality | Scanning Controls | Mechanical Design | HP ScanJet IIcx |
| | | Image Editing Software | HP ScanJet IIcx |
| | Image Editing Software | Scanning Controls | HP ScanJet IIcx |
| | | Price | Umax ScanOffice/C |
| Price | Image Quality | Mechanical Design | Umax ScanOffice/C |
| | | Scanning Controls | Envisions ENV8100 |
| | Image Editing Software | Scanning Controls | Envisions ENV8100 |
| | | Service & Support | Mustek Paragon 600 |
| Mechanical Design | Scanning Controls | Price | Canon IX-4015 |
| | | Image Quality | HP ScanJet IIcx |
| | Price | Service & Support | Canon IX-4015 |
| | | Documentation | AVR 6600/CLX |

PC Best

### Color Scanner

## HP ScanJet IIcx

**IMAGE QUALITY:** The grayscale and interpolated scans of HP's ScanJet IIcx were top-notch. Color captures were also impressive, though not perfect.

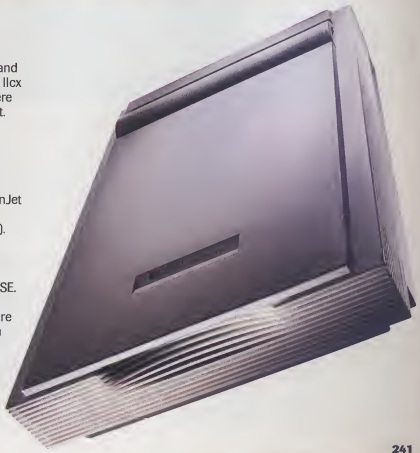
**PRICE:** You can find cheaper scanners, but the ScanJet's $1,179 price tag is reasonable.

**MECHANICAL DESIGN:** The ScanJet is easy to set up and has a large scanning window (18 by 14 inches).

**IMAGE HANDLING SOFTWARE:** The scanning software is well-designed, and you get PhotoStyler SE.

**SCANNING CONTROLS:** These are simpler controls than most, though we preferred the Canon IX-4015's.

**ScanJet IIcx** / Hewlett-Packard / (800) 722-6538 / $1,179
*Circle No. 856 on Reader Service Card*



PHOTOGRAPH BY MARK JOHANN

# Best 200 Peripherals

## Color Scanners

| Rank | Product | Pros & Cons | Image Quality 30%* | Price 20% | Mechanical Design 15% | Software 10% | Scanning Controls 10% | Documentation 5% | Ease of Installation 5% | Service & Support 5% | Total Score |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PC Best 1 | **ScanJet IIcx**<br>Hewlett-Packard<br>(800) 722-6538<br>$1,179<br>*Reader Service No. 856* | **Pros:** Well-designed scanning software, PhotoStyler SE, fastest.<br>**Cons:** Direct selection of resolution difficult. | 8.1 | 8.7 | 8.9 | 9.4 | 8.7 | 9.5 | 9.5 | 8.5 | 86.9 |
| 2 | **ScanMaker IISP**<br>Microtek Lab<br>(800) 654-4160<br>$850<br>*Reader Service No. 857* | **Pros:** High-ranking color and grayscale scans, one-pass scanning, Photoshop LE.<br>**Cons:** Could be faster. | 8.0 | 9.6 | 7.3 | 9.4 | 6.1 | 9.5 | 8.9 | 8.0 | 82.9 |
| 3 | **Envisions ENV8100**<br>Envisions Solutions<br>(800) 365-7226<br>$699<br>*Reader Service No. 858* | **Pros:** Good grays, Image Folio by ProLab, low price.<br>**Cons:** Poor interpolation evident in our tests. | 7.8 | 9.8 | 7.1 | 8.9 | 7.8 | 8.5 | 7.6 | 8.0 | 82.4 |
| 4 | **Canon IX-4015**<br>Canon Computer Systems<br>(800) 848-4123<br>$1,175<br>*Reader Service No. 859* | **Pros:** Second fastest scanning, easy-to-use Ofoto software.<br>**Cons:** Won't accept legal-sized paper. | 7.2 | 8.7 | 8.7 | 7.7 | 8.8 | 7.5 | 9.3 | 9.0 | 81.5 |
| 5 | **ScanMaker IIXE**<br>Microtek Lab<br>(800) 654-4160<br>$1,299<br>*Reader Service No. 860* | **Pros:** Photoshop 2.5, fine interpolation.<br>**Cons:** Less-than-impressive color and gray scans. | 7.7 | 8.4 | 7.1 | 9.4 | 6.8 | 9.5 | 8.8 | 8.0 | 79.9 |
| 6 | **ScanOffice/C ****<br>Umax Technologies<br>(800) 562-0311<br>$895<br>*Reader Service No. 861* | **Pros:** Good color, excellent cost, lots of bundled software.<br>**Cons:** Slow, average gray scans, poor interpolation. | 7.8 | 9.3 | 7.1 | 9.3 | 6.1 | 8.0 | 7.9 | 7.0 | 79.5 |
| 7 | **AVR 8800/CLX ****<br>AVR Technology<br>(800) 544-6243<br>$999<br>*Reader Service No. 862* | **Pros:** Second rank in grayscale scans.<br>**Cons:** Slow, controls aren't as advanced as some others. | 7.8 | 9.1 | 7.1 | 9.2 | 6.8 | 8.5 | 7.0 | 7.0 | 79.5 |
| 8 | **AVR 6600/CLX**<br>AVR Technology<br>(800) 544-6243<br>$675<br>*Reader Service No. 863* | **Pros:** Photoshop LE, prescan gives preview of file size.<br>**Cons:** Middling performance and scans. | 7.5 | 9.4 | 8.6 | 6.5 | 6.8 | 8.5 | 7.9 | 7.0 | 79.2 |
| 9 | **Paragon 600**<br>Mustek<br>(800) 468-7835<br>$1,395<br>*Reader Service No. 864* | **Pros:** Good software, Photoshop LE.<br>**Cons:** Color prescan not always clear, sluggish scans. | 7.7 | 8.2 | 7.0 | 8.9 | 6.3 | 8.5 | 7.6 | 8.0 | 77.3 |
| 10 | **Epson ES-800C Pro**<br>Epson America<br>(800) 289-3776<br>$1,499 | **Pros:** Great grayscale scans, good speed, Picture Publisher.<br>**Cons:** Middle-of-the-pack color scans. | 7.1 | 8.0 | 7.4 | 9.4 | 6.8 | 8.5 | 7.9 | 8.5 | 77.1 |

*PERCENTAGES REFLECT THE WEIGHT OF EACH FACTOR IN TOTAL SCORE. FACTORS ARE SCORED ON A SCALE OF 1 TO 10. TOTAL SCORES ARE NORMALIZED TO A SCALE OF 1 TO 100. NOTEWORTHY SCORES ARE HIGHLIGHTED IN RED. **IN THE EVENT OF A TIE IN TOTAL SCORES, THE MORE AFFORDABLE PRODUCT IS RANKED HIGHER.

## Usability Close-Up
## Sheet-Feeder Upgrades in a Snap

With **Canon's IX-4015,** the original cover snaps off simply. A multiple-page sheet feeder snaps into the vacated slots just as easily, and the interface cable attaches via accessible ports. Overall, this scanner is effortlessly upgradable.

**Up to You** Canon's IX-4015 has accessible ports and easy upgrades.

## Performance Spotlight: Scan Time

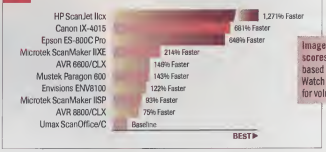



Image quality scores (above) are based on jury tests. Watch scan speed for volume jobs.

PHOTOGRAPH BY ARNOLD TIOSEJO

PHOTOGRAPH BY DAVID PERBY

## RICH SCHWERIN **PC288LCD**

All right, I confess: I'm an online junkie. I spend more time scanning AP NewsBriefs and checking the humidity in Bali than Michael Jordan does missing pop flies. But how can you blame me? From liner notes to line scores, all of the information I could ask for is online. I'm perfectly content tooling around CompuServe, ZiffNet, and America Online—all part of my personal electronic utopia. And as far as I'm concerned, there's no better way to speed down the information autobahn than behind the wheel of Practical Peripherals' PC288LCD modem. It's screamingly fast—V.Fast—so I'm never wasting valuable time waiting for that 10MB PCX file to download. Now if it could only help Jordan with his hitting.

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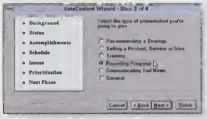

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# Help

BRIAN LIVINGSTON SHATTERS PATH BARRIERS

# The Path Less Traveled

The year is 1983. Ronald Reagan is president. Real estate prices are flying high. DOS is in Version 2.0 and you're glad you can have a 127-character PATH statement. Skip forward 11 years. It's 1994. The White House has changed residents and you're beginning to wonder if you can refinance at 6 percent. DOS is up to Version 6.2.

You're running Windows 3.1. Your PATH length? Still 127 characters. The more things change, the more things stay the same.

No more. A 127-character PATH statement was long enough for a 20MB hard drive and a few DOS programs, but today's 100MB (and larger) hard drives and complex Windows applications eat 127 characters before breakfast. This month I'll show you some tricks to circumvent PATH's limitations in both DOS and Windows.

**No SUBST Please** Before we delve into the undocumented PATH patches for Windows, let's talk about DOS. A partial fix for the 127-byte PATH limitation appeared in DOS 3.1 with SUBST. The SUBST command substitutes a shorter name for a long directory name. For example, the following command (typed at a DOS prompt or into a batch file) causes the directory C:\MYAPPS\UTILS to become synonymous with the drive letter D:

```
SUBST D: C:\MYAPPS\UTILS
```

After issuing this command, type D: at a DOS prompt, and your current directory becomes C:\MYAPPS\UTILS. If you type DIR D:, the directory listing you get is that of C:\MYAPPS\UTILS, and so on. The UTIL subdirectory now looks and acts like the root directory of a D: drive. This can make your path statement much shorter. Instead of:

```
PATH=C:\DOS;C:\WINDOWS;C:\MYAPPS\UTILS
```

you could have:

```
PATH=C:\DOS;C:\WINDOWS;D:\
```

To remove a substituted drive, use the SUBST command with a delete (/D) switch. For example, the following command removes any associations from drive D:

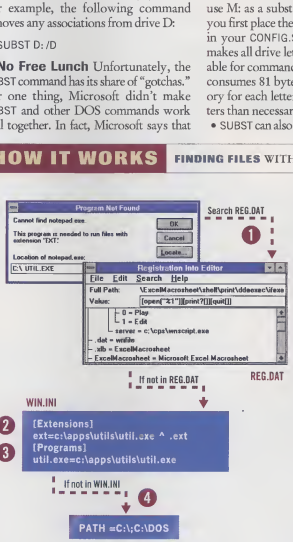
```
SUBST D: /D
```

**No Free Lunch** Unfortunately, the SUBST command has its share of "gotchas." For one thing, Microsoft didn't make SUBST and other DOS commands work well together. In fact, Microsoft says that you shouldn't use SUBST with any of the following DOS commands: ASSIGN, BACKUP, CHKDSK, DEFRAG, DISKCOMP, DISKCOPY, FDISK, FORMAT, LABEL, MIRROR, RECOVER, RESTORE, SYS, UNDELETE /S.

Here are some other known problems:

- SUBST may not work if you try to assign it to a drive letter higher than the first available drive letter in your system. In other words, if you have hard drives named C: and D:, you won't be able to use M: as a substituted drive letter unless you first place the statement LASTDRIVE=M in your CONFIG.SYS file. This command makes all drive letters from E: to M: available for commands such as SUBST. It also consumes 81 bytes of conventional memory for each letter, so don't add more letters than necessary.
- SUBST can also have problems with drive

## HOW IT WORKS — FINDING FILES WITHIN WINDOWS




When you double-click on a filename in File Manager, you set in motion an elaborate search procedure.

**1. REGEDIT** Windows first looks in the Registration Database (REG.DAT) for Open and Print definitions for that extension.

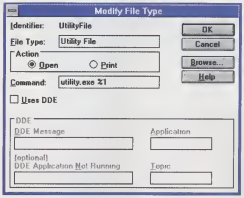
**2. EXTENSIONS** Next, Windows searches WIN.INI for an association in the [Extensions] section.

**3. PROGRAMS** If Windows finds an association in one of these two places, but the associated application is not found in the Windows directory or in the path, it looks in the WIN.INI [Programs] section for drive and directory reference for that application.

**4. DOS PATH** When all else fails, Windows throws up its hands and asks DOS to supply a path.

## WORKAROUNDS REGEDIT INSTEAD OF THE PATH

**Bypass:** Get around DOS's 127-character PATH limit in Windows by telling RegEdit where to find a program. In this example, all you need to do is modify RegEdit's Command field to include the program's full path. Windows will now find it when you double-click on a filename that's associated with it in File Manager.




letters when you use DoubleSpace in DOS 6 or 6.2. You should not use SUBST on drive letters between the last physical drive letter and the first DoubleSpace drive letter in your system. So if your hard drive is C: and a DoubleSpace volume is on K:, don't use D: through J: for SUBST.

• Windows presents its own set of problems when using SUBST. Microsoft says that you shouldn't run a SUBST command in a DOS session under Windows. I've found SUBST works fine with Windows, as long as you don't delete a substituted drive letter in a DOS session.

**On the Right Path** Why mess with SUBST when Windows 3.1 provides three ways to get around the archaic PATH limitations? What? You've never heard of them? Of course not: Microsoft says little or nothing about them in the Windows manual. Here goes.

Windows 3.0 provided an [Extensions] section in WIN.INI that lets you establish associations between file extensions and your programs. What you probably don't know about the [Extensions] section is that you can insert almost any valid command-line switches or options to the right of the equal sign, including drive and directory names for your application. Say you wanted to open DOC files in myeditor.exe. You could do so without adding myeditor.exe to your PATH. Just include the drive and directory name in the [Extensions] setting, as follows:

```
[Extensions]
doc=c:\myapps\editor\myeditor.exe ^.doc
```

File extension associations are great, but they don't always work the way you think they should. Let's say that you have an application that uses the extension REP. No problem. Now, you install a second application that also uses REP. Your experience tells you that, while the second application has some nice features, you'd like to keep using the first one to edit REP files, after all. So you go into WIN.INI and change the [Extensions] section so it looks like this:

```
[Extensions]
rep=firstapp.exe ^.rep
```

After you save WIN.INI and restart Windows to make your changes take effect, double-click on a REP file in File Manager, and—surprise! You've launched the second application. What happened?

**Enter RegEdit** Windows 3.1 added a feature called the Registration Database. The Registration Database overrides any information you put into the [Extensions] section of WIN.INI. It's also virtually undocumented: The Windows 3.1 manual says nothing about it, except a confusing reference in the Index to "See Online Help for Registration Information Editor." But checking Help reveals no such topic. That would be too easy. Instead, you must run WINHELP.EXE, click on File Open, and open the files REGEDIT.HLP and REGEDITV.HLP. Now *that's* intuitive.

These Help files provide a terse description of a curious little applet called RegEdit. The executable file, REGEDIT.EXE, is a powerful tool to help you circumvent PATH requirements, determine how Windows should print files, and control the OLE behavior of various applications.

Most Windows applications make entries into the Registration Database when you install them. Once an application registers the extensions it uses, you can associate other extensions with that application. To do this in File Manager,

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**F1:** *You've seen the term "virtual memory" all over the place, but just what is this stuff and how does it work? Better yet, how can you make it work for you? Robert Hummel explains everything.* **276**

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first select a filename that has the appropriate extension (such as EXT), then click File Associate on the main menu.

Using the File Associate dialog box is the fastest way to establish extension associations, but RegEdit has much more powerful capabilities. With RegEdit, you can determine several other aspects of that program's behavior when you Open or Print a file from File Manager.

Let's assume that you install an application named UTILITY.EXE. This application installs a listing in the Registration Database, but doesn't include a drive and directory name for its executable files. Therefore, you have to add its directory to your PATH statement in AUTOEXEC.BAT, but you're already out of space there. So what can you do?

In this case, if you select File Run in File Manager and type REGEDIT.EXE, you will see a window listing registered files. In the Registered File Type column, you see a listing for Utility File—or whatever description your Utility application uses to describe its data files.

Click on the Utility File line once, then pull down the Edit menu and click on Modify File Type. You should see a window showing the command line that File Manager uses when you double-click on a file, select File Open, drag a filename onto the Print Manager icon, or select File Print. In this example, the Command Line to open a file is UTILITY.EXE %1. The parameter %1 represents the name of the file you double-clicked.

Simply insert the correct drive and directory name in front of UTILITY.EXE, and Windows will be able to find this application without requiring that it be in your PATH. For example, the correct command line might be C:\APPS\UTILS\UTILITY.EXE %1. This technique is similar to specifying the full path to a command in DOS.

You should also click on the Print button in the RegEdit window and amend the command line for the Print command. You'll probably see that the application supports some command-line method to print files when you select File Print in File Manager. This method probably doesn't involve opening the application and probably uses a parameter such as /P, as in UTILITY.EXE /P %1.

**Set Your Path In WIN.INI** This next method that Windows uses to find an application's PATH involves an even more obscure Windows function: the [Programs] section of your WIN.INI file.

You can see this at work for yourself. In File Manager, simply drag NOTEPAD.EXE from the Windows directory into another location that isn't on your PATH or in the System subdirectory—C:\TEMP, for example. Now double-click on a TXT file in File Manager. Windows looks for NOTEPAD.EXE in the current directory, then looks in the Windows directory, then in the System subdirectory, and finally in all the directories in your PATH.

Failing to locate NOTEPAD.EXE in any of those places (which takes only a fraction of a second), Windows displays an unusual dialog box: "Location of notepad.exe?" Simply type C:\TEMP in the box and click on OK. Windows writes a line like the following into a new [Programs] section of WIN.INI:

```
[Programs]
notepad.exe=c:\temp\notepad.exe
```

From now on, when you double-click on any filename associated with Notepad (including TXT and INI files), File Manager opens the file in Notepad just as you would expect—even though NOTEPAD.EXE isn't in any of the directories on your PATH.

Unfortunately, this path backup method is weak. Though this section exists in WIN.INI, Windows does not update the Registration Database with the new information. Any change with RegEdit will override the [Programs] section (see "Finding Files Within Windows" on page 246). You can't select File Run and type NOTEPAD.EXE and expect any shell to find the program. It won't run unless you precede the program name with the full drive and directory names. For these reasons, I suggest you ignore the [Programs] section and concentrate on getting to know RegEdit.

I hope one of the above techniques gets you on the right PATH.

---

Guru BRIAN LIVINGSTON is the author of *Windows 3.1 Secrets* and *More Windows Secrets*, and is co-author of *Windows Gizmos* (all three of which are published by IDG Books).

## BEST BUY LIVINGSTON BRINGS OUT THE HEAVY GUNS

Even with the techniques in this month's column, you may find that you need some extra power to help you overcome your path limitations. Here are two of my favorite utilities:

1. **Stackey/Batutil 4.0** is a collection of more than 100 command-line and memory-resident utilities for DOS. One of them even allows you to create a working path that can have up to 255 characters, bashing DOS's 127-character limitation.

2. **WinChange** will help you edit Program Manager and INI files quickly. For example, what if you hard-coded directory names into your Program Manager icons? No problem, until you move the programs represented by those icons. Suddenly you find that your Program Manager's icons have become meaningless—blank icons that will do nothing when you click on them. WinChange will edit the necessary Program Manager GRP and INI files. For example, you can tell it to change all references to C:\WINWORD into D:\WPWIN.

You can download unlicensed, shareware versions of Stackey/Batutil (STACKY.ZIP) and WinChange (WINCHG.ZIP) from PC Contact's data library 3 (Utilities/Misc.).

**PC Contact**

**Stackey/Batutil 4.0**
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| Backup & Antivirus | YES | YES |
| Built-in networking | YES | NO |

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WHAT ARE THOSE MYSTERIOUS FILES?

# Handle Your DLLs and VxDs with a Little TLC

If you want to master Windows, prepare to learn a few TLAs (three-letter acronyms). Windows is chock-full of them—everything from GUI to DDE to OLE—but two of the most mystifying are DLL and VxD. Dynamic link libraries (DLLs) and virtual device drivers (VxDs) are the programming building blocks behind much of the technological wizardry in Windows and Windows applications. Why should you care? Because once you understand how DLLs and VxDs work, you open up a world of performance-boosting possibilities and add a potent troubleshooting weapon to your arsenal.

**Share, Share Alike** A DLL is an executable file much like the more familiar EXE and COM files. Unlike executable application files, you can't start DLLs from the command line. Instead, they contain commonly used routines and resources that Windows and Windows applications call when you need them. When you run Windows, you regularly use an assortment of DLLs. For example, the common dialog library, COMMDLG-.DLL, gives applications a uniform set of dialog boxes for opening and saving files.

DLLs can cause low-grade headaches for Windows users when it's time to upgrade applications. Nearly every Windows application installs some DLLs. Outdated DLLs clutter up your Windows directory, and sloppy installation programs can scatter duplicate copies throughout your hard disk. Over time, your Windows and System directories suffer the hard disk equivalent of clogged arteries. Here's how to break through the clutter:

- Learn which DLLs are on your system. For starters, look for files with the extension DLL in your WINDOWS\SYSTEM subdirectory. The date stamp on the file will often give you a clue to its provenance: Files dated 3-10-92 belong to Windows 3.1. A date stamp of 10-1-92 tells you they were part of Windows for Workgroups 3.1. If you've upgraded to Version 3.11 of Windows for Workgroups, you'll find a slew of system files dated 11-1-93.

For a global view of DLL distribution, open File Manager and choose Search from the File menu. Enter .DLL in the Search For box and C:\ in the Start From box, make sure the Include Subdirectories box is checked, and click OK.

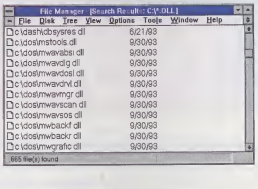
- Weed out duplicate DLLs. Common conflicts in DLL-ville include BWCC.DLL. This library of routines often comes with applications whose developers used Borland's C++, a Windows compiler. Outdated versions of OLECLI.DLL and OLESVR.DLL—the Windows files that manage OLE 1.0 operations—occasionally cause problems.

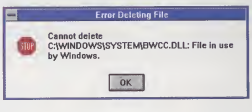
Unless you know exactly what you're doing, deleting a DLL file—especially from your WINDOWS\SYSTEM directory—can be a bad idea. Still, moving DLLs that you suspect are outdated or unnecessary is a useful troubleshooting technique. From the DOS prompt (not within Windows), create a subdirectory called DLL and move any questionable files there. Now restart Windows and run all of the applications you use. If your system continues to run flawlessly after a few days or weeks, it's probably safe to remove the DLL directory and reclaim its disk space.

**Power Tools** VxDs are among the most powerful parts of Enhanced-mode Windows. Usually written in low-level assembly language, VxDs give Windows and Windows applications direct access to hardware and system functions. (OK, if they're virtual device drivers, why VxD and not VDD? The *x* indicates that the device can be a piece of hardware—even the CPU—or the operating system itself. Thus, VKD is a virtual keyboard driver, while VPASD is a virtual driver for

## WORKAROUNDS DELETE DLLS FOR DISK SPACE

**Crave disk space?** Let File Manager find your DLLs, then move duplicates. But don't remove the DLLs from your MS-DOS 6.*x* directory—Windows may actually look for a couple in there, such as MWAVMGR.DLL and MWBACKF.DLL.




**Error, error!** Look at how protective Windows is of its DLLs. You must not delete DLLs from File Manager. Instead, go to a DOS prompt to perform your DLL cleanup.

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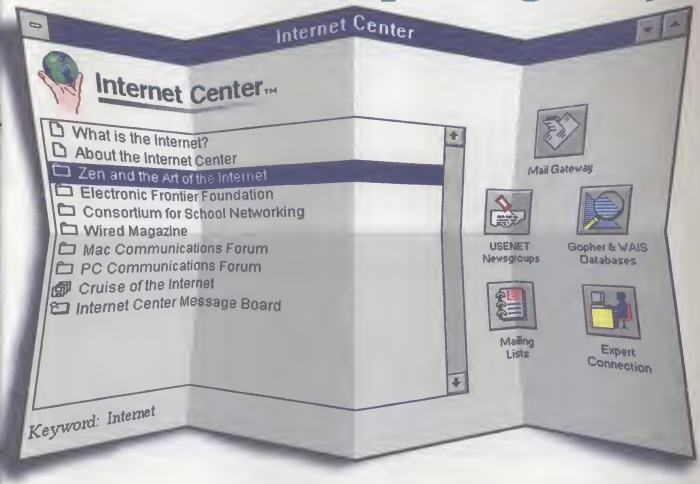


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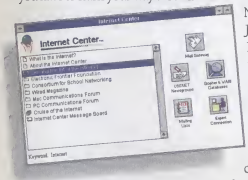


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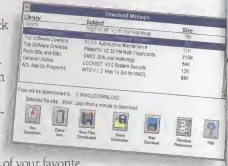


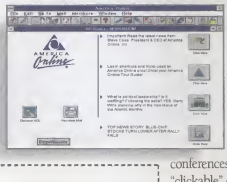


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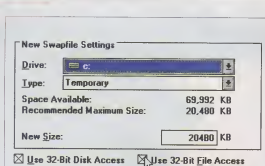
## WORKAROUNDS BREATHTAKING SPEED BOOST

**Faster Disk Access:** With virtual device drivers (VxDs), gaining speed is as easy as clicking on Use 32-Bit Disk Access in the Control Panel's 386 Enhanced section. If you have Windows for Workgroups 3.11, you can turn on 32-bit File Access, too.




Media Vision's Pro Audio Spectrum 16.)

VxDs run in 32-bit protected mode as part of WIN386.EXE, the Windows virtual machine manager. And because they completely bypass the slow BIOS and old-fashioned DOS drivers, VxDs can dramatically speed up performance of everyday tasks such as serial port communication and hard drive access.

Windows 3.1 includes dozens of VxDs, and Windows for Workgroups 3.11 takes full advantage of this technology with its powerful 32-bit File Access (called VFAT.386, for virtual file allocation table) and virtual network drivers.

There's a catch, however: Because VxDs attach themselves to Windows, even a tiny bug can crash your entire system. Finding out whether the problem is VxD related can be a tedious chore. The only way to load or unload VxDs is to edit SYSTEM.INI and restart Windows. That's why it pays to keep a careful eye on every VxD in your system. Here's how to do it:

• Know your VxDs. Any virtual device drivers loaded in your system are listed in the [386Enh] section of SYSTEM.INI, found in your Windows directory. VxDs typically end with the .386 extension, so look for lines like this:

```
device=vshare.386
mouse=lvmd.386
```

• Keep a backup of SYSTEM.INI. In particular, back up SYSTEM.INI (and WIN.INI) immediately before installing any new Windows application or driver. If something goes wrong you can restore your PC to its previous state with a COPY command.

• Start Windows in Standard mode by typing WIN /S at the DOS prompt: This is a good way to test for VxD-related problems, because VxDs work only in 386 Enhanced mode. (Note that this technique won't work with Windows for Workgroups 3.11, because it runs only in Enhanced mode.)

Above all, be careful! Tinkering with SYSTEM.INI is like fiddling with fuel rods in a nuclear reactor—you might wind up with a system that runs more smoothly, or you might have a meltdown on your hands. Fortunately, a Windows meltdown doesn't endanger the lives of everyone around you. Just break out your backups, take a deep breath, sweep up the mess, and start all over again. ED BOTT

### PC Contact WEED OUT DLLs

**DLL Manager**
To expertly manage applications and their accompanying DLLs, try DLL Manager. Point to a DLL file and it lists the applications that use that DLL. Or point to an executable file to get the set of DLLs associated with that program—this free utility works in either direction. It's especially handy when you need to weed out duplicate or obsolete DLLs. Download DLLMAN.ZIP from PC Contact's data library 3 (Utilities/Misc.). See page 282 for information on ordering the disk from Public Brand Software.

## WIN TIPS

### MOBILE FONTS

**Problem:** *You print your files at a location that doesn't have your application or fonts.*

**Solution:** Many users find themselves in this situation—desktop publishing projects may require a PostScript printer, but the only one around is two floors below your office, and no network in sight. You can still do it with a bit of Sneakernet savvy. Set up Windows with the remote printer's driver. In the Control Panel, select Printers, Connect, and set up File as the port to print to. When you select this printer during a print job, Windows will prompt you for a filename. If you have a disk in drive A:, type A:*filename*.PRN. For example, A:NWSLTR.PRN. Take that disk to a computer that's attached to the printer and type:

```
COPY A:\NWSLTR.PRN LPT1: /B
```

at a DOS prompt. Substitute the correct drive letter and the printer port name as needed.

MATTHEW LAKE
SENIOR EDITOR

### LOCK YOUR DESKTOP

**Problem:** *Unauthorized users make changes to your desktop configuration.*

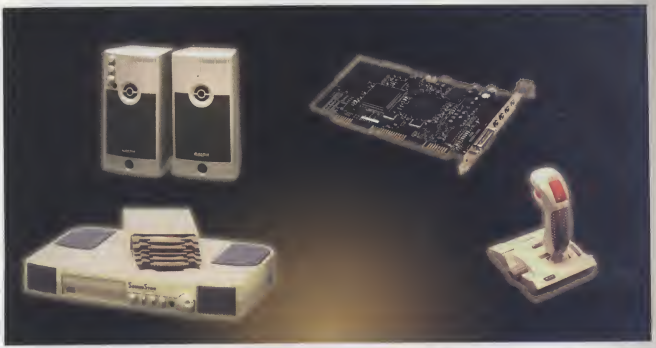
**Solution:** Restrict these activities by editing PROGMAN.INI. Here's how: Launch Notepad, open PROGMAN.INI, and add the lines

```
EditLevel=4
NoSaveSettings=1
```

under the [Restrictions] heading. If there's no such heading, create one at the end of the [Settings] section. Save and exit Windows. When you reload Windows, the Save Settings on Exit bar in the Options menu will be dimmed, and all attempts to create, delete, or rename groups or program items will be denied.

S. G. HUBERT
LAHAINA, HAWAII

# *QuickShot.*



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# Help WINDOWS TIPS:
## Substitute Fonts • Swap Mouse Buttons • Ignore StartUp Group

### LAUNCH CONTROL PANEL

**Problem:** *You want a quick way to launch Control Panel programs.*

**Solution:** Rather than opening Main, Control Panel, and then the desired applet in the Control Panel, you can type CONTROL *appname* at the File Run menu in Program Manager or File Manager. For example, CONTROL DESKTOP will launch the Desktop configuration window. When you exit that window, Control Panel and Main close automatically, saving you more keystrokes in the process.

CHRISTINE GRECH
SAN FRANCISCO, CALIFORNIA

### FONT SUBSTITUTION

**Problem:** *Co-workers send you files that include fonts you don't have installed, which are displayed incorrectly when you open them.*

**Solution:** Create a better font substitution. Find out the name of the missing font, then open WIN.INI in Windows' Notepad and go to the [Font Substitutes] section. Add a line such as Courier=Arial to make every occurrence of Courier appear as Arial.

ALAN GILBERT
NEW YORK, NEW YORK

### AMBIDEXTROUS MOUSE

**Problem:** *To swap MS-Mouse buttons, you need to use the Control Panel.*

**Solution:** In DOS 6, go to the \WINDOWS directory and copy MOUSE.INI to MOUSE.RH and MOUSE.LH. Make MOUSE.LH a "left-handed" file by editing it in a text editor. Change PrimaryButton=1 and SecondaryButton=3 to PrimaryButton=3 and SecondaryButton=1. Add these lines if they're not there. Next, edit the batch file (usually AUTOEXEC.BAT) that calls Windows. Insert the following lines before the WIN command:

```
CHOICE "Are you a left-handed
mouse user? (Y/N)"
IF ERRORLEVEL 2 COPY
\MSMOUSE\MOUSE.RH
\MSMOUSE\MOUSE.INI
IF ERRORLEVEL 1 IF NOT
ERRORLEVEL 2
COPY \MSMOUSE\MOUSE.LH
\MSMOUSE\MOUSE.INI
```

ROGER W. SAUER
FAIRFIELD, CALIFORNIA

### START WITHOUT STARTUP

**Problem:** *You don't want to load the contents of the StartUp group every time you run Windows.*

**Solution:** To skip the contents of StartUp, hold down the Shift key while the Microsoft logo is visible. If you want to bypass the StartUp group while loading and reloading Windows during the day, change the name of the group. Hold down Alt and double click on the StartUp group icon. In the Program Group Properties dialog box, insert an exclamation point in front of the word StartUp and click on OK. This prevents Windows from recognizing it as the

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StartUp group. The exclamation point serves as a visual reminder to you that the group is disabled. To restore the group, call up the Program Group Properties dialog box again and remove the exclamation point.

MATTHEW LAKE
SENIOR EDITOR

## FASTER DOS SESSIONS

**Problem:** *Your DOS sessions run too slowly under Windows.*

**Solution:** Determine how fast your DOS sessions will run under Windows by controlling what percentage of the CPU's processing capacity they get. Run a DOS session and select System, Settings. Increase the Foreground and Background priority settings. The higher the number, the more attention the DOS session will get. Try doubling the default values.

ALISTAIR GRIEVE
CAMBRIDGE, MASSACHUSETTS

## CREATE USAGE LOG

**Problem:** *You need to keep track of how you're using your system.*

**Solution:** Use Notepad to create a log file. In a new Notepad document, type .LOG (in caps) at the left margin on the first line. Then save the file as USAGE.LOG (or any such descriptive name) in your Windows directory. The next time you open this file, the current date and time will appear at the end of the document. Next, type a comment or a description of the activity, save, and exit Notepad. For best results, create an icon for this newly-created log file in your working window in Program Manager. To do so, select File, New, Program Item; type Usage Log in the Description box; then enter NOTEPAD USAGE.LOG in the Command Line box for and C:\WINDOWS for the Working Directory.

MATTHEW LAKE
SENIOR EDITOR

## HOT TIP WINDOWS FONTS

**Problem:** Squinting at the tiny fonts on the Windows Desktop gives you a headache.

**Solution:** To enlarge the default icon titles, launch Notepad, open WIN.INI, and add the following lines under the [Desktop] heading:

```
IconTitleFaceName=Arial
IconTitleSize=11
IconSpacing=86
```

Change the font name and size to your liking. Note: The larger the font, the more space necessary for each icon—otherwise the titles overlap. To modify the File Manager display, select Options Font.

—S. G. HUBERT
LAHAINA, HAWAII


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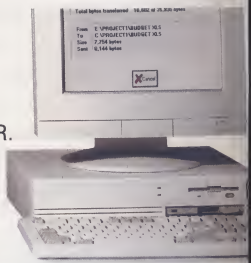

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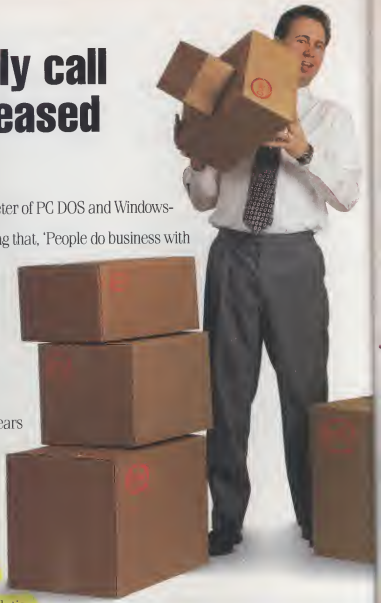

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SAVE RAM WITH SELECTIVE BOOT

# Memory Management? Don't Bother

If memory management gives you the willies, relax and try the selective boot feature in MS-DOS 6. Rather than trying to fit all your programs into limited space, a selective boot loads only the device drivers and TSRs that you need for a particular operation. If you think that selective boot means keeping multiple copies of your CONFIG.SYS and AUTOEXEC.BAT files and continually renaming them, you'll quickly see that DOS's alternative is far more elegant.

**Create a Startup Menu** Before you start playing around, make a copy of your CONFIG.SYS and AUTOEXEC.BAT files, just in case. Not that anything's likely to go wrong, but better safe than sorry.

There are only a few commands you need to know when editing your CONFIG.SYS and AUTOEXEC.BAT files for a selective boot menu. The important ones are MENU, COMMON, MENUDEFAULT, and MENUITEM. We could go on ad nauseam about options and parameters to these commands, but experience is the best teacher. Here is part of a CONFIG.SYS file that creates a three-item boot menu:

```
[MENU]
MENUDEFAULT=Network,15
MENUITEM=Network,Load Network
MENUITEM=CD-ROM,Setup for CD-ROM
MENUITEM=Scanner,Setup for Scanner
[COMMON]
REM Put the commands you want ↵
↳ executed every time you boot here. ↵
↳ For example:
DEVICE=C:\DOS\HIMEM.SYS
DEVICE=C:\DOS\EMM386.EXE NOEMS
DOS=HIGH,UMB
SHELL=C:\DOS\COMMAND.COM ↵
↳ C:\DOS\/E:1024 /P
[NETWORK]
REM Put the commands related to your ↵
↳ network here. For example:
LASTDRIVE=E
[CD-ROM]
REM Put the commands to load your ↵
↳ CD-ROM device driver here. For example:
DEVICE=C:\SB16\DRV\SBCD.SYS ↵
↳ /D:MSCD001 /P:240
```

The lines that begin with REM are comments, or remarks, to let you know what's going on. At the top of the file, the MENUDEFAULT command is optional, but it's a good idea to use it because it sets your preference for default boot option with a time-out parameter: If you don't press any key within the specified number of seconds, your system will continue to boot with MENUDEFAULT's configuration.

You must follow the MENUITEM command with an identifying variable name and the text you wish to appear in the boot menu. Each MENUITEM must also coincide with a section heading (which will appear in brackets later in CONFIG.SYS).

Another setup term you can use is MENUCOLOR, which sets foreground and background colors. If you want to use this tool, it should be the first entry under the [MENU] heading.

**The CONFIG Variable** MS-DOS saves your boot option in memory as a variable called CONFIG—handy in case you want AUTOEXEC.BAT to configure itself to match the boot parameters set up in CONFIG.SYS. In our example, place the line

```
GOTO %CONFIG%
```

at the start of your AUTOEXEC.BAT. You'll also need to create appropriate labels in the AUTOEXEC.BAT. In other words, you'll need lines that read :CDROM, :NETWORK, and :SCANNER. A colon precedes each label so AUTOEXEC.BAT knows these words are labels. After each label, enter the commands you want to run for that type of boot. At the end of each section add the line GOTO END, and add the line :END at the file's end.

To use the Startup Menu, type the number that corresponds to your selection or scroll to it and press Enter. Beyond memory management considerations, this setup may work well on systems shared by several users if you create a menu that lets you select your favorite configurations. YAEL LI-RON

TIPS SPREADSHEETS

## QUATTRO PRO 5.0 FOR DOS

**Problem:** *Quattro Pro lacks a way to round fractions up to the next whole number.*

**Solution:** The @ROUND function rounds down any decimal lower than 0.5. If you want to round up all fractions, try the following macro:

```
     A    B
30   '\R  {LET @CELLPOINTER ↵
          ↳ ("Address"),@INT ↵
          ↳ (@CELLPOINTER ↵
          ↳ ("Contents")+0.99)}
31        {D}
32        {if @cellpointer ↵
          ↳ ("Type")="V"} ↵
          ↳ {branch\R}{quit}
```

To name the macro, go to cell A30, press /ENLR, and press Enter. Whenever you want to round up a column of numbers, go to the top cell in the column and press Alt-R. The macro will continue executing until it reaches a cell that doesn't contain a value. This macro rounds up decimals equal to or greater than 0.01; if you want to apply it to other decimal values, replace the 0.99 with the appropriate number.

P.M. PEREKA
KUNDASALE, SRI LANKA

## LOTUS 1-2-3 RELEASE 2 FOR DOS

**Problem:** *Text does not stand out from your worksheet's data.*

**Solution:** To get important text to pop out from the page, make the text bigger. Create a macro to convert it to 24-point outline font:

```
     A    B
34   '\X  ':te~{name}o{esc}
35        ':ff3~
```

To name the macro, go to cell A34, press /RNLR, and press Enter. This macro works only in Wysiwyg mode, and it assumes that the third

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# Help APPLICATION TIPS: Random Names and Values in Excel 5

font in your font list is 24 point. If you want to use a different font, replace the 3 in cell B35 with the appropriate number. Press Alt-X to apply the special effects to your current cell.

EVE LAUBER
NEW YORK, NEW YORK

**Problem:** *Lotus 1-2-3 can't convert dates to Julian format.*

**Solution:** The Julian format, YYYYDDD, displays the numeric value of the date within a year. For example, Christmas is the 359th day in 1994, so its Julian date is 1994359. To display a date in this format, enter the date in cell A1 as @DATE(YY,MM,DD), and type the following formula in cell A2:

```
1900000+1000*@YEAR(A1)+↲
↳@INT(@MOD(A1,365.25))
```

The date in A1 is a numeric value. To format it as MM/DD/YY, press /RFD4.

SHANE DEVENSHIRE
WALNUT CREEK, CALIFORNIA

## MICROSOFT EXCEL 5.0

**Problem:** *You want to select a random name or value from a data table.*

**Solution:** Assuming that your data table is in cells from B5 to D18, type this formula into an unused cell where you want to display the random selection:

```
=INDEX(B5:D18,RANDBETWEEN↲
↳(1,ROWS(B5:D18)),RAND↲
↳BETWEEN(1,COLUMNS(B5:D18)))
```

Because this is an array formula, press Ctrl-Shift-Enter to enter it—pressing Enter alone will result in an error. Whenever you press F9 to calculate, the formula will display another random selection.

DAVID HAGER
BATON ROUGE, LOUISIANA

**TIPS** WORD PROCESSORS

## WORDPERFECT 6.0 FOR WINDOWS

**Problem:** *You can create a graphic with WordPerfect's Draw, but you can't save it as a WPG file.*

**Solution:** Draw is a dedicated WordPerfect for Windows program that exists to edit drawings placed in a document. You can also create graphics in Draw, but you can place the results only into the current document.

After you've created the image in Draw, grab all of the components of the image by choosing Edit, Select, All. Copy the image to the clipboard by using Ctrl-C. Switch over to WordPerfect and paste the image into a new file using Ctrl-V. Next, single-click with the right-mouse button over the pasted-in graphic and hold down the mouse button. Choose the Content option from the pop-up menu.

In the Box Content dialog box, click on the Image button next to the word Content and select Image on Disk from the button selections. From the Save As dialog box, type in a filename with the extension WPG for the graphic

**HOT TIP** 1-2-3 RELEASE 2.4

**Problem:** You want to list weekdays as column headings in your payroll spreadsheet.

**Solution:** Let's say you need to list all the weekdays in August 1994. Enter the first day in the list into cell A1 as follows: @DATE(94,8,1). Now type this formula into cell B1:

```
+A1+@CHOOSE(@MOD↲
↳(A1,7)^.4,2,1,3)
```

Note: The ^ symbol is the caret—Shift-6. Copy the formula to the range B1..W1. Convert the values to date format by selecting /RFD4 and specifying A1..W1 as the range. If you need to count the number of work days for the month, go to a different cell and type @COUNT(A1..W1).

—SHANE DEVENSHIRE
WALNUT CREEK, CALIFORNIA

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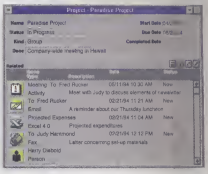


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# Help APPLICATION TIPS: Open Multiple Word Documents

and place it with your other WPG files. Click on OK twice to close the Save As and Box Content dialog boxes. To retrieve the graphic, put the cursor at your insertion point and select Graphic, Figure and choose the file you created from the list that is displayed by WordPerfect.

RANDY FINCH
FLORENCE, ALABAMA

## WORD 6.0 FOR WINDOWS

**Problem:** *You need to open multiple documents but you don't want to have to wade through a succession of Open dialog boxes.*

**Solution:** You have two options. Either you can hold down the Ctrl key while you click on each filename, or you can type the name of each file in the File Name box. Word will open each file in the order you select or type it. Therefore, if you need to begin working on a particular document first, select it last. This technique works only with documents from the same directory.

BRAD VISSCHER
BURLINGTON, ONTARIO

**Problem:** *After creating dialog boxes that include the* **DialogAddEditBox** *macro command, you can't jump to the next line of a multiline dialog box by hitting Enter.*

**Solution:** When you create your definitions for the dialog box, insert the undocumented value 512 with the DialogDefine command to instruct WordPerfect to accept the Enter key for new lines.

GORDON MCCOMB
OCEANSIDE, CALIFORNIA

## TIPS DOS MEMORY MANAGERS

### QEMM 7

**Problem:** *Each time you run Optimize, it loads a program that must run in low memory into upper memory.*

**Solution:** Exclude that program from optimization. Remove the LOADHI command that Optimize added before the troublesome program and run Optimize again, but type OPTIMIZE.EXE /L at the prompt. The /L switch tells Optimize to analyze only lines that have a LOADHI command.

Now see if Optimize can load other drivers or TSRs in your program's former upper memory spot: Comment out your program by preceding it with REM and run Optimize without the /L switch. Then remove REM from before your program and run Optimize again with the /L switch.

KEN JOHNSON
OAK PARK, ILLINOIS

**Problem:** *After installing a network adapter, you discover that some device drivers no longer load high.*

**Solution:** Although network adapters aren't the only peripherals to exhibit this behavior, they are among the most common. Note: You're definitely going to need your network adapter's manual and probably a screwdriver for this tip. The network adapter probably

## HOT TIP ACCESS 1.1

**Problem:** You need to add data-entry instructions to fields so that anybody can understand what to do.

**Solution:** Place a training message on the status bar: Go into the Table Design view and enter your instructions into the Descriptions column. Remember not to exceed 60 characters—if you do, Access will truncate the message. Now, when you're in the table view, the instructions will appear on the status bar at the bottom of the screen. Use this feature for instructions such as "Type last name first" or "Don't forget the area code."

—SHANE DEVENSHIRE
WALNUT CREEK, CALIFORNIA

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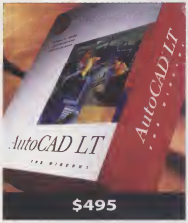


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allocated some fragments of high memory, making it impossible for large TSRs to load. Change the jumpers on your network adapter to make it allocate consecutive memory areas. What areas are those? QEMM's Manifest can help you determine the best address for the adapter to allocate.

Before you make any changes, use a text editor to add the parameter ON MAPS=0 to the DEVICE=QEMM386.SYS line in your CONFIG.SYS file. The presence of multiple memory maps can be very misleading to QEMM's Manifest utility. To make the change to system's CONFIG.SYS file take effect, reboot your computer once you've saved and exited.

Next, run Manifest. Select QEMM, Type and look for a large area of unallocated memory. Identify which of the options in your adapter's manual best match the available locations, exit Manifest, and turn off your computer. Pull out the adapter and reset its jumpers so that it will allocate the consecutive area of memory Manifest found. Reinstall the adapter, turn on your system, rerun Optimize, and you should be able to claim more of your upper memory.

QUARTERDECK
TECHNICAL SUPPORT DEPARTMENT

## NETROOM 3

**Problem:** *You have run out of high memory into which to load TSRs.*

**Solution:** Add the EBDALOW parameter to NetRoom 3's RM386 command in your AUTOEXEC.BAT file and run Customize again. The EBDALOW parameter forces the BIOS to load into low memory. With the extra space, Customize may be able to place a larger TSR in upper memory and provide a net gain in available RAM.

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**TIPS** DATABASES

## MICROSOFT ACCESS 1.1

**Problem:** *Access prints an underscore (_) in a report title where you've typed an ampersand (&).*

**Solution:** The ampersand is a reserved symbol that Access uses to combine two string variables. For example, if your report header or title should say "Franklin & Sons," the unacceptable result is "Franklin _Sons." Instead, type "Franklin && Sons," and the second ampersand will display properly.

GWYNNE CORDOVA
EVANSVILLE, INDIANA

## DBASE IV

**Problem:** *You want to verify the DOS version before your application calls DOS commands.*

**Solution:** At the DOS prompt, go into a text editor such as EDIT in MS-DOS 5 or higher and type the following DEBUG script:

```
N DOS_VER.BIN
E 0100 55 8B EC 83 F9 02 7C 0F
E 0108 B4 30 CD 21 26 C5 5D 04
E 0110 88 27 26 C5 1D 88 07 5D
E 0118 CB
RCX
19
W
Q
```

Exit and save the file as DOS_VER.SCR. At the DOS prompt, type DEBUG<DOS_VER.SCR to create the binary file. Now go into dBASE and add the following routine to your procedure file:

```
LOAD DOS_VER
STORE SPACE(1) TO DOS_MAJ, ↵
↳DOS_MIN
CALL DOS_VER WITH DOS_MAJ, ↵
↳DOS_MIN
m_dosint=str(asc(dos_maj))
m_dosdec=ltrim(str(asc(dos_min)))
?m_dosint+"." +m_dosdec
RELEASE MODULE DOS_VER
```

If you don't have a procedure file, it's very easy to create one. At the dBASE "dot" prompt, type MODIFY COMMAND MYPROX at the dot prompt.

ROGER SAUER
FAIRFIELD, CALIFORNIA

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CHASING VISIO WITH GARLIC AND AN OLE AUTO STAKE

# VB Asketh, "Visio, Visio, Wherefore Art Thou?"

I am the Vampire O'LEstat. I'm immortal. I feast on the procedures of other denizens of the WinOoze—the bytes that inadvertently disturb my fevered slumber; the furry libraries that come scurrying to their doom when I call; the variables, strangely powerless in my deadly embrace. The sentient ones are but servers to my bidding, writhing in horror until I choose to discard their spent routines. I am OLE Auto Client. Hear me roar. (With apologies to Anne Rice.)

We had a chance to dive into Visio 2.0, a product from an OLE 2.0 pioneer, Shapeware Corporation. We were stunned by the flexibility and power Visio delivers as an OLE Auto server. We were also stunned by how difficult it is to find accurate documentation or working examples.

This month we'll show you how we went about uncovering the OLE Auto capabilities of Visio. Next month we'll use that newly acquired knowledge to build an amazingly powerful Visio-Visual Basic business-card–printing application with just a few dozen lines of Visual Basic code.

**The Visio Vision** As you probably know, Visio is a stencil-based drawing program—a technical boon to the artistically inhibited. *[Note to editor: Don't mention Woody by name.]* To build complex pictures, you choose from a plethora of simple pictures, then size and hook them together.

One of Visio's most powerful templates is its Forms template, which includes fill-in-the-blanks–style pictures, borders, fax cover sheets, and all sorts of other goodies. Our favorite picture in the Forms template is the business card. Couple it with some fancy microperforated paper and voila—you'll have the beginnings of a custom business-card–printing foundry to rival those megabuck kiosks in the malls.

The hard part, perhaps surprisingly, is in figuring out the names Visio uses to identify parts of a business card. C'mon and we'll show you how.

Start Visio and choose the Forms template to create a new document based on Forms. Scroll down the stencil on the left side to the very last shape, the Business card, click on it once, then drag a business card to the upper-left corner of the document.

That part is easy enough. Now it gets tough. We knew that Visio could act as an OLE 2.0 server, that it would respond to the OLE 2.0 overtures of an OLE vampire . . . er . . . client like Visual Basic 3.0. We saw a couple of snippets of code on CompuServe that worked—or at least, the folks who wrote the code claimed they worked. But we couldn't figure out how to get at the pieces of the business card.

So we decided to play with it a bit. Wading through the online help's Programming Language Reference topic helped a bit. Ultimately, we got down and dirty with a quick custom Visual Basic program.

**Start Your Visual Basic** Start up Visual Basic 3.0. Double-click on the oval push-button icon, type List SubShapes, then resize and move the push button to the upper-left corner of your screen. Similarly, make a second push button with the title Get SubShape Text. Double-click on the List box icon and put a list box in the upper-right corner. Finally, double-click on the capital A icon and put a label in the lower-right corner. Your finished work should look something like the screen in "How Your Forms Will Look," on page 270.

Double-click on the List SubShapes button, and type in the first program in "Do You Support OLE Auto?" below. Connecting with an already-running

## HOW TO DO IT DO YOU SUPPORT OLE AUTO?

The program behind the List SubShapes push button retrieves a list of the names of all valid blocks in Visio's business card stencil. It looks like this:

```
Sub Command1_Click ()
Dim OhVisio As Object
Dim BusCard As Object, CardBlock As Object
    Set OhVisio = GetObject(, "visio.application")
    Set BusCard = OhVisio.ActivePage.shapes
    Set CardBlock = BusCard(1).shapes
    List1.Clear
    For i = 1 To CardBlock.Count
    List1.AddItem (CardBlock(i).Name)
    Next i
End Sub
```

The program behind the Get SubShape Text push button retrieves the contents of the chosen business card block. It looks like this:

```
Sub Command2_Click ()
Dim OhVisio As Object
Dim BusCard As Object, CardBlock As Object
    If List1.ListIndex < 0 Then Exit Sub
    Set OhVisio = GetObject(, "visio.application")
    Set BusCard = OhVisio.ActivePage.shapes
    Set CardBlock = BusCard(1).shapes(List1.ListIndex + 1)
    Label1.Caption = CardBlock.Text
End Sub
```

# MAKE YOUR WINDOWS 3.1

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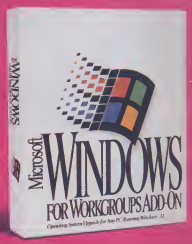


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## WORKAROUNDS

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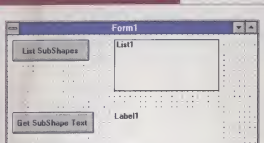
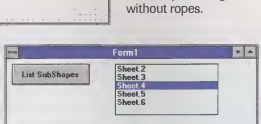



**Visio's OLE Auto:** It's not well documented. In fact, it's like a cave: dark. This is the raw Visual Basic 3.0 form we'll use to plumb the depths of Visio's OLE Auto capabilities. It's like spelunking without ropes.




**Success!** Our application strikes a match in the depths of Visio. Highlighting Sheet.4, our Visual Basic applet tells us that it contains the text for the Company Name portion of the business card.

Visio under OLE 2.0 is as easy as connecting with any other OLE Auto server. The magic incantation looks like this:

```
Set OhVisio = GetObject(, "visio. ↲
↳application")
```

The command works like the GetObject command used to invoke Word for Windows 6.0 or Excel 5.0 as an OLE Auto client. Grabbing the business card isn't much more difficult. To Visio's way of thinking, an active page may contain zero or more shapes, such as our business card:

```
Set BusCard = OhVisio.ActivePage.shapes
```

Now it gets complicated. Visio builds shapes by tying together component shapes, which in turn may consist of other component shapes. We want to retrieve all of the component shapes within the first business card. We called them CardBlocks, but you can call them anything you like:

```
Set CardBlock = BusCard(1).shapes
```

Finally, the loop around List1.AddItem just lists the names of all SubShapes in the business card, putting them in the list box.

Save your Visual Basic program, click the right-wedgie (Play) button, then push the List SubShape button. You get an inscrutable list of CardBlock names. The business card has five SubShapes, cleverly called Sheet.2, Sheet.3, Sheet.4, Sheet.5, and Sheet.6.

Double-click on the Get SubShape Text box and type in the second program in "Do You Support OLE Auto?" on page 268. This program double-checks to make sure one of the listed SubShapes is selected, then goes out to Visio to retrieve the .Text associated with the chosen CardBlock: the "contents" of the indicated SubShape.

**The New Math** The only oddity in this program is that Visual Basic starts numbering items in list boxes at zero, while Visio starts numbering shapes at one; ergo, the +1 in the BusCard(1).shapes(List1.ListIndex + 1) subscript. Must be the new math.

Save everything again and run your Visual Basic program. Click on the top button to get a list of valid SubShape names. Highlight Sheet.4, for example, then click on the lower button. See how "Company Name" is the text for Sheet.4?

With this information, next month we'll build an OLE 2.0 business card engine that will amaze you.

WOODY LEONHARD & VINCENT CHEN

Why don't you stay for the night—or maybe just a byte? Let's do the time warp again: Contact WOODY 72241,2125 and VINCE 72241,2221 on PC Contact. See page 282 for log-on instructions.

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## TOOL TIPS

### BORLAND C++ 4.0

**Problem:** *You want to set the background color of your main (and only) window.*

**Solution:** When you register your window's class, you should set the hbrBackground member of the WndClass to the brush of the color you want.

BORLAND TECHNICAL SUPPORT

### ANY C++ COMPILER

**Problem:** *You're a C programmer learning C++ and want to start speaking C++ quickly.*

**Solution:** The easiest way is to start by eliminating some of the constructs you're most used to. First, use C++'s const and inline instead of C's #define. The compiler never sees definitions you make with #define—it just sees the result. So if you say

```
#define HEIGHT 243.12
```

the preprocessor goes through your code and replaces HEIGHT with 243.12. It's easier to remember const, however, than 243.12. C++'s const statement (const float HEIGHT = 243.12) enables you to find occurrences of HEIGHT, rather than searching for 243.12. While you're changing things, use cout and cin instead of printf and scanf, and use C++'s iostream.h instead of C's stdio.h if you possibly can. Finally, use C++-style comments (//) instead of C's (/* */).

FARGUS NEWMAN
OREM, UTAH

### MICROSOFT VISUAL C++

**Problem:** *You just created a dialog box and you want to align all the controls (sliders, check boxes, and so on) to make it pretty.*

**Solution:** Select the controls by clicking on the first one and shift-clicking on the others you want aligned. Next, choose one

# Yes,

# you can do Windows™ and walls and doors and floors, ceilings, whole 's, 's, trains, boats, 's, chains, 's, diamond rings, 's and things, 's, power plants, topo maps, 's, helicopters, roads and bridges, circuit boards, 's power lines, 's, airports, furniture, digital terrain models, 's, skateboards, the , 's, chemical plants, 's, golf courses, anything you can think of ... even the kitchen

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Circle 127 on reader service card.

of the alignment commands (Left, Right, Top, or Bottom) from the Align Controls pop-up menu in the Layout menu.

ALAN GILBERT
NEW YORK, NEW YORK

## VISUAL BASIC 3.0 FOR WINDOWS

**Problem:** *You have a new application that takes awfully long to load.*

**Solution:** There are three general tips to heed. First, simplify your startup form, cutting out unnecessary bitmaps and code. Use the startup form as a place from which users can launch other forms. Second, don't call procedures from other modules at startup if you can avoid it—Visual Basic loads the entire module, which takes time. Finally, make sure that VBRUN300.DLL is loaded before you start your executable. If it isn't, the executable must load it. You can accomplish this by writing a small Visual Basic application (such as a clock) that runs all the time on your system and loads VBRUN300.DLL before any other application needs it.

MICROSOFT
TECHNICAL SUPPORT

**Problem:** *Your new application takes up too much memory.*

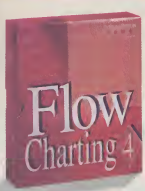
**Solution:** Write smaller code. But seriously, reduce the number of forms you load at once, and load only the data you need when you need it. Organize your code in modules that can be loaded when needed and unloaded when they're not. Minimize the use of the Variant data type—it's flexible, but it also uses lots of memory. Free unused variables by setting them to Nothing. Eliminate dead code: This is generally a good practice in any language, and Visual Basic doesn't even make an effort at eliminating dead code when you build.

ALFRED ROSEMAN
NEW YORK, NEW YORK

**Problem:** *Your graphics take up too much memory.*

**Solution:** First, use the Image control instead of the Picture-box control to display bitmaps—it uses a lot less memory. Second, set AutoRedraw to False in your forms and controls. If you don't, Visual Basic will keep a copy of the bitmap it uses to repaint them. Third, use Run-Length Encoded bitmaps instead of regular bitmaps, because they take up less memory and aren't any slower to load. Fourth, load bitmaps only as needed, using the LoadPicture function and keeping pictures in separate files. Fifth, when you aren't using a picture, use the LoadPicture function—this empties the Picture property. Finally, if you use the Image property of a picture box or form, Visual Basic will create an AutoRedraw bitmap. So when you're finished with the Image property, reclaim the memory by setting AutoRedraw to False.

MICROSOFT
TECHNICAL SUPPORT

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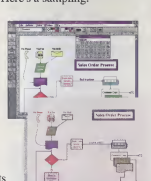


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# Help TOOLKIT TIPS:
## Change Fonts · Use Keyboard Shortcuts · Sort Arrays in CA-Realizer

### CA-REALIZER FOR WINDOWS

**Problem:** *You want to change the font the text editor uses.*

**Solution:** Using any text editor, open the REALIZER.INI file in your Windows directory. Find the line that starts with EditFont= and change the font and size after the equal sign to whatever you want. For example:

EditFont= Arial Bold 10.

COMPUTER ASSOCIATES
TECHNICAL SUPPORT

**Problem:** *You want your application to modify initialization files automatically.*

**Solution:** Use formatted EXTERNAL calls to the Windows kernel functions GetPrivateProfileString and WritePrivateProfileString. Here is a section of commented sample code:

```
EXTERNAL "krnl386" FUNC
WritePrivateProfileString
( POINTER, POINTER, POINTER,
POINTER) AS BYTE
writeSuccess = WritePrivate
ProfileString( "theSection",
"theEntry", "theString",
"C:\Windows\Win.Ini")
IF writeSuccess = 0 THEN
    MessageBox("Write fail",
    "Message", _MB_OK)
ELSE
    MessageBox("Write success",
    "Message", _MB_OK)
END IF
```

This code will attempt to write an entry into a particular section of WIN.INI and then it will tell you if it completed the task.

COMPUTER ASSOCIATES
TECHNICAL SUPPORT

**Problem:** *You want users to be able to use keyboard shortcuts for actions that are not available via menu.*

**Solution:** This is easy. Create an invisible menu. Use the MenuNew command and attach the accelerator keys and procedures to the new menu. The secret is: Never call the MenuControl(_Show) command.

COMPUTER ASSOCIATES
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### HOT TIP CA-REALIZER

**Problem:** You want to sort an array of records based on one of its fields.

**Solution:** You can use Realizer to extract a one-dimensional array from an array of record structures and its StatSort function. Let's suppose that you have an array called (PeopleArray) in the sample record People, and that this array has fields called Name, Phone, and Salary. Here's the code you can use to sort this array by Name:

```
PeopleArray = StatSort
( PeopleArray.Name,
PeopleArray)
```

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**Circle 144 on reader service card.**

FROM HARD DISK TO RAM

# The Magic Behind Virtual Memory

Asked to describe virtual memory, Abraham Lincoln might have said: "You can access all of the memory some of the time, some of the memory all of the time, but you can't access all of the memory all of the time." Or maybe he wouldn't have. Virtual memory is a processing sleight-of-hand that fools your system into thinking that a hard disk or other storage device is memory.

Virtual memory has been a hot topic for large computer systems since the early 1960s. It wasn't until 1982, however, when Intel made 1974's 8086 obsolete and introduced the 80286 with its protected-mode memory management, that PCs could take advantage of this power.

Remember the 8088? The 8086? These processors use a very simple memory addressing method called *real mode*. Applications compiled for these processors generate memory addresses that map directly to physical addresses in RAM. Put into simple terms, real mode means your applications can use only as much memory as you have RAM in your system; virtual memory is not possible.

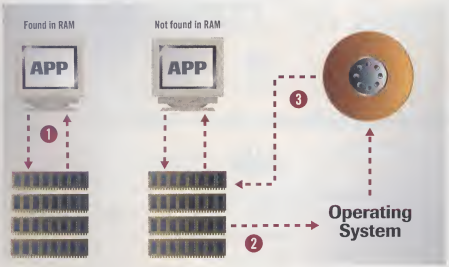
The 286 replaced real mode with *protected mode*. Under protected mode, applications generate *logical* memory addresses that the processor translates into physical memory locations. In other words, when an application requests a specific byte from memory, that request runs through the 286's translation table, which identifies where that byte actually resides in the computer's memory.

**Tracking Segments** To keep track of memory, the 286 assigns areas, or *segments*, to an application as necessary. A segment's size depends on the application. The segments can be noncontiguous and can be moved without affecting the application. It's even possible to move segments out of memory onto the hard disk in a process called *swapping*. If an application attempts to access a segment that the operating system has swapped out of memory, the processor signals the operating system to move the required data back into memory. When a microprocessor makes use of a hard disk as though it were RAM, it is using *virtual memory*—it's not really RAM, but it looks just like RAM to applications.

One of the problems with the 286's

## HOW IT WORKS THE SECRET OF THAT MAGICAL TRANSFORMATION REVEALED

**Virtual Memory:** It makes your computer think that space on your hard disk is actually RAM. When an application needs information that the CPU's virtual memory subsystem has moved onto the hard disk, however, your system can get bogged down.




**1. Request** An application requests information and the CPU determines whether the data is in RAM. If it is, RAM delivers the data quickly.

**2. Page Fault** If the data isn't in RAM, the CPU generates a page fault and passes control to the operating system to get the data off the disk. The operating system finds and moves the requested data from disk into RAM. If all the RAM is full, the page swapping routine moves the least recently used data to the hard disk.

**3. Return** The operating system tells the CPU that the requested data is now in RAM, and passes control back to the CPU.

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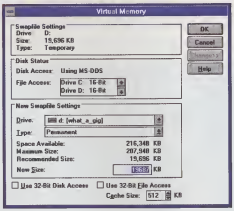
## WORKAROUNDS CHANGE SWAP FILE SIZES

**Swap Switch:** Click on the Virtual Memory option of the 386 Enhanced icon in the Control Panel to adjust the swap file's characteristics. A big, permanent swap file has some advantages. To change the maximum size, you'll have to crawl into SYSTEM.INI and set the PageOverCommit factor in the [386Enh] section to 20.




segment-based virtual memory is that it moves entire segments into or out of memory. Segments can be relatively (and arbitrarily) large. Thus, swapping on a 286 can be inefficient and slow. The 386's *demand-paging* scheme solved this problem.

Although new to the PC, demand paging was a well-established mainframe memory-management technique. Paging divides the PC's memory space into uniformly sized chunks called *pages*. When your computer needs to access a memory address, instead of loading a 4GB segment (for example), the processor needs to load only the 4K page that contains that address. Paging enables parts of applications to reside in RAM, and other parts to be swapped onto the disk. Consequently, because less of each application needs to be resident in physical memory, more applications can run in the same amount of RAM.

Demand paging adds a level of complexity to the 386's address translations: A paging unit on the 386 must perform additional translations to identify required pages. If a particular page is not currently in physical memory, the processor sends a signal to the operating system to retrieve it. The CPU swaps the page in and completes the translation to a physical address.

Virtual memory sounds as if it's too good to be true. It is: Virtual memory extracts a cost in system performance.

Each time an application accesses a page that isn't in RAM, the processor interrupts the operating system and tells it to bring in a page from the swapping device (usually your hard disk). This usually means that the CPU must also make room in memory by saving one of

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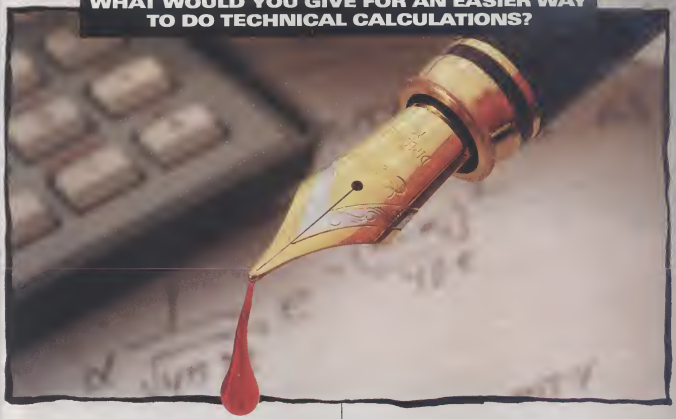

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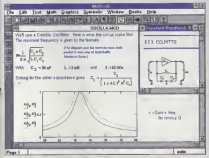

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the pages to disk. Because accessing a disk takes about 1,000 times longer than accessing memory, performance degrades.

To keep page swapping and disk activity to a minimum—and performance to a maximum—the operating system determines which pages to swap out by identifying the least recently used (LRU) page. If you load too many applications into memory, or the LRU algorithm incorrectly predicts an application's behavior, the CPU can swap pages in and out continuously. This situation is called *thrashing* and it slows your system's performance. The fix is simple but not particularly elegant: Either close some applications or add more physical memory.

**A Virtual Tune-up** Two of virtual memory's drawbacks are that it requires disk space for the swap file and it decreases processing speed when swapping. Although the information doesn't appear in the *Windows User's Guide*, you're not helpless to control your system's use of paging and virtual memory. Windows Enhanced mode enables paging by default. To disable paging, insert the following line in your SYSTEM.INI file under the [386Enh] heading:

```
paging=off
```

Now Windows won't use any virtual memory so there's no swapping. You may find that you can't run as many applications simultaneously as before, but your applications won't be slowed by swapping.

If you're willing to sacrifice some potential performance, go in the opposite direction and increase the amount of virtual memory. By default, Windows calculates the size of your virtual memory pool according to the following formula: It takes the amount of physical memory in your system rounded up to a multiple of 4MB, then multiplies the result by the PageOverCommit factor (set to 4 by default). Finally, it subtracts the amount of physical memory.

A system with 16MB of memory, for example, would create 16 x 4 - 16 = 48MB of virtual memory. Of course, other factors, including available disk space for the swap file, influence the maximum size of your virtual memory pool. PCs with 4MB or less of memory typically use smaller swap files.

You can even change the PageOverCommit factor. This number can range from 1 (no virtual memory) to 20 (lots and lots of virtual memory). The larger the number, the more disk space your swap file will occupy when Windows performs its calculation. To change this factor, insert the following line in your SYSTEM.INI file under the [386Enh] heading, where *n* is the desired factor:

```
PageOverCommit=n
```

Be warned: The more virtual memory you create, the more likely thrashing is to occur. But if you're trying to run a large application on an underendowed machine, running slowly is better than not running at all.

---

ROBERT L. HUMMEL is the author of *Programmer's Technical Reference: The Processor and Coprocessor*, from Ziff-Davis Press (1991). You can reach him on CompuServe at 72241,2222 or by writing *PC Computing*, 950 Tower Lane, 19th Floor, Foster City, CA 94404.

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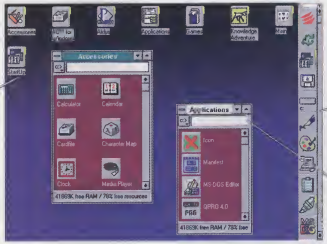


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# This Month's Free Software and Shareware

All the public-domain and shareware programs and utilities featured in *PC Computing* each month are available on our online service, PC Contact, or on disk from Public Brand Software for a fee. Shareware requires additional payment to authors for continued use. All this month's files are available in PC Contact's data library 3 (Utilities/Misc). For information on ordering them from Public Brand Software, see below. Here's a sampling of the programs you'll find this month.

## LIVINGSTON: ULTIMATE BATCHES 248

**Stackey/Batutil 4.0** Stack commands on top of each other with this collection of utilities. For example, Stackey/Batutil enables you to load Lotus 1-2-3 for DOS, open a particular worksheet, and run a series of commands on it—all from a DOS batch file. Download STACKY.ZIP.

## LIVINGSTON: INI EDITOR 248

**WinChange** If you've ever installed a Windows program, then moved it to a different directory, you know the frustration of changing all those icon properties and all the references to the group files. Sometimes it's easier to reinstall. Use WinChange instead. Download WINCHG.ZIP.

## WINDOWS: WEED OUT DLLs 254

**DLL Manager** Get a handle on your DLLs with DLL Manager. This freeware product identifies which applications use which DLL files and vice versa—just point at an application and click to see. Use this utility to weed out duplicate or obsolete DLLs. Look for DLLMAN.ZIP.

### TOP PICKS ON DISK

You can easily get all the public-domain utilities or shareware covered in this month's issue by calling the disk vendor Public Brand Software at (800) 426-3475 or (317) 856-7571. Ask for this month's Editors' Picks from *PC Computing*. They're available for $5 or less per disk (most disks have several utilities and programs on them), plus $5 for shipping and handling.

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3. Dial the access number with a modem. When your modem connects to the network, press Ctrl-C to get the system's attention.
4. At the HOST NAME prompt, type CIS and press Enter.
5. At the USER ID prompt, type 177000,5300 and press Enter.
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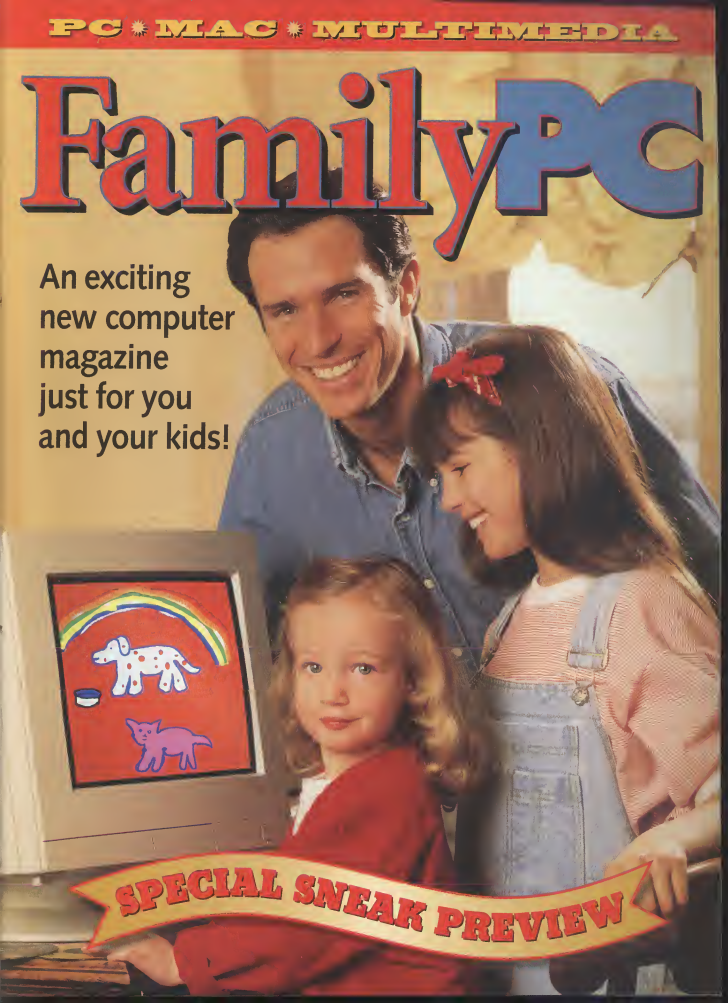

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## From the Editor

# FamilyPC Sneak Preview

IT'S LATE, and I'm going through the time crunch experienced by every working parent. My daughter, Jenna, has just gone to sleep. Luckily, I've got a computer at home to write this column because it's due in the morning.

A few hours ago, Jenna and I wrote a bedtime story on this same computer. She sat in my lap and dictated a wonderful, nonsensical story about her teddy bear — the kind that only a three-year-old could conceive. With a couple clicks of the mouse, she illustrated "Dodo's Story" with houses, flowerpots, little girls, and assorted bears, and she printed it out. My wife, Cindy, laughed with her as they reread Jenna's new bedtime story together.

Whether you're managing your family's finances after the kids go to bed, helping your grade-schooler spell-check a research paper, or playing a great family game, today's desktop computer is the most versatile, powerful, and entertaining machine ever to make its way into our homes.

Realistically, though, it's also one of the most complicated and frustrating devices. I need help, and I figure there are many other parents like me out there. That's why we've created an entirely new kind of computer magazine — one written by parents.

You're holding a sneak preview of *FamilyPC* in your hands. Our mission is simple. *FamilyPC* was created to help you select the right computer and software and to ensure that you and your kids get the most from them. To publish this magazine, we've created a unique joint venture between the Walt Disney Company, the publisher of *FamilyFun*, the leading family magazine, and Ziff-Davis, the world's leading publisher of computer magazines.

You won't have to struggle with confusing jargon and technical terms with *FamilyPC*. We've worked hard to make the magazine easy to read, practical, and, most of all, lots of fun. But take a look at the articles that follow and see for yourself.

If you like what you read, please fill out and send in one of the enclosed *FamilyPC* subscription cards. We will mail your family a free trial copy of *FamilyPC*'s premier issue in August. It will be filled with many more wonderful features. I'm confident you and your kids will find dozens of great ideas and a wealth of useful information throughout.

— JAKE WINEBAUM
*Editor & Publisher*

## WHAT YOU'LL FIND INSIDE:


### Parties 6

**A Pirate's Birthday Bash:** Eye patches, pirate loot, hungry sharks, and a treasure hunt — all created on your computer — make this a party to remember.

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**Good-bye TV, Hello Multimedia PC:** In the market for a new computer? Be sure and check out our FamilyTested reviews of three hot multimedia machines.

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COVER / EDITOR'S NOTE PHOTOGRAPHS BY AUGUSTUS BUTEKA

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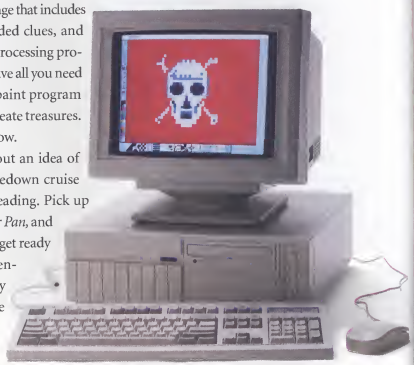
# A Pirate's BIRTHDAY BASH

*Ship ahoy! Here's a party plan for computer-age buccaneers.*

By Steve and Ruth Bennett

IF THE ASPIRING swashbuckler in your household is about to celebrate a birthday, your ship has arrived. You, your kids, and your computer can embark on a voyage that includes pirate maps, loot, coded clues, and buried treasure. If you have a word-processing program and a dot-matrix printer, you have all you need for a rollicking party. If you have a paint program or a color printer, you can literally create treasures. This party planner will show you how.



But no captain ever set sail without an idea of where he was going. So take a shakedown cruise to the library for fun preliminary reading. Pick up a copy of *Swiss Family Robinson, Peter Pan,* and *Treasure Island* for inspiration. Then get ready to cast off the lines. When this adventure is through, your birthday party will be a classic tale, not soon to be forgotten.

# CREATING YOUR OWN INVITATION

SINCE YOUR INVITATION sets the tone for the entire event, base it on a pirate's most valued possession: a treasure map. Using your word-processing or drawing program, type in the important information — the birthday child's name, the party date and time, and your address and telephone number. Set up the page (see "page setup" for Macintosh or "print setup" for Windows) so that the image will print out in a wide (landscape) format, like treasure maps of old. Position the party information in the bottom, right-hand corner similar to a legend on a map, and where no map details will need to appear. Experiment with different typefaces — remember, some pirates wrote with long, flowing characters, so be flamboyant.

**The Map:** If you are using only a word-processing program, print out a master copy and then draw in the map with crayons, colored pencils, or markers. Use silver and gold pens and glitter for special highlights. This map, which leads to your home, should be inspiring: designate your house with a colorful "X"; name a nearby park "Never-Never Land" or a familiar hill "Blind Man's Bluff." Exaggerate backyard features such as a tree house, and draw the imprints of little feet to show where to go. You can also add a serpent, a ship, or a mermaid for decoration. Once the map is complete, take your special paper to a color copy service and make enough for the whole crew.

If you have a drawing program, you can use your drawing tool to create the features of the map as well as the text (see FamilyPC Tip on page 10). Some drawing programs, such as Kid Pix and Kid Pix Companion by Brøderbund, include "stamps" that can be placed anywhere on the map.

**What you'll need**

**Software:**
*Word-processing or drawing program*

**Other Materials:**
*Crayons, colored pencils, or markers, off-white paper, red ribbon, sealing wax*

Complete clip art packages, such as ClickArt by T/Maker, offer even more images. If you have a color printer, add colors to the background and the map details.

**Finishing Touches:** Give the invitations an authentic appearance by carefully singeing the edges (this should be done by the parent only). Just hold the edge of the invitation briefly over a burning candle. For an aged look, lightly brush the paper with tea or coffee. After they've dried, roll the invitations up and neatly tie red ribbons around them for hand delivery. If you are going to mail them, fold the invitations in thirds. The final touch is applying a wax seal to either the roll or the letter, just like Captain Kidd might have, hundreds of years ago.

*Photographs by Michael Carroll*

# MINTING LOTTERY-SIZED LOOT

While eye patches, hooks, and swords are sure to delight any pirate, what really shivers their timbers is riches: cold hard currency, and fistfuls of it. Minting pirate loot on your computer is a real pleasure because it is so easy to make so many different kinds of money. Before the party, create big money checks for the crew, drawn on such venerable institutions as the "Salty Dog Trust Company." The checks should be redeemable for amounts such as a million doubloons. Make dollar bills of large denominations as well.

Using a word-processing or drawing program, design the checks and dollar bills so that two or three can be printed on a single piece of letter-sized paper. It is especially quick when you make a master design, and copy and paste it into the two empty spaces on the same page.

Then save the finished forms as templates — that way you can customize the bills and checks without having to redraw them each time you want to make a change.

If you are doing the project on your word-processing program, make master copies of your money, then add artistic images with a marker before taking them to a copy shop. If you are using a drawing program, add zany images of parrots, desert islands, or sailing ships with either clip art or hand-drawn pictures to your templates. To make extra special money, draw an oval-shaped space on the master copies, and paste on a fun picture of the birthday child. Beneath the mug shot, emblazon your child's pirate name. Make multiple photocopies.

Using brightly colored or fluorescent paper, print or copy enough loot so that each member of the crew gets a healthy wad.

**What you'll need**

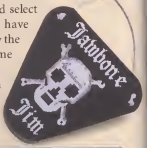
**Software:**
*Paint, drawing, or word-processing program*

**Optional Software:**
*Clip art*

**Other Materials:**
*Crayons, colored pencils, markers*

# DESIGNING PROPER PIRATE ATTIRE

There is no better way of getting your young partygoers into a swashbuckling mood than by having them dress up in proper pirate attire. As guests arrive, invite them to shed their shoes and socks and select paraphernalia you have stashed in a trunk by the door. Here are some ideas.




Any pirate worth his or her salt will want to wear an eye patch. A drawing program such as Kid Pix is perfect for this project. Start off with a large triangle with circular corners, then add clip art — Kid Pix Companion features a great skull and crossbones stamp. Copy and paste the patch several times on the page. Personalize each patch by adding each guest's name with a pirate nickname, such as "Terrible Tom."

**What you'll need**

**Software:**
*Drawing program*

**Optional Software:**
*Clip art*

**Other Materials:**
*Glue or double-stick tape, card stock, elastic thread, bandannas*

Print the eye patches and affix or copy them on card stock. Make a small hole at the top on either side of the patch, then reinforce the holes with transparent tape. Finally, feed an elastic thread through the holes and tie a knot, taping the thread in place.

You can recreate Captain Hook's iron appendage by using an empty yogurt container with an aluminum foil hook fed through a hole in the bottom. (Use the part of the hook that passes through the hole as a handle.) Don't forget thick belts slung over shoulders (for holding swords), vests, and knickers (long shorts). Bandannas tied at the back of the head top off the outfit.

On the big day, help them don their pirate head gear and other costume apparel and organize an impromptu pirate parade through the house.

# CREATING A TREASURE OF A TREASURE HUNT

NEXT TO BLOWING out the candles and opening presents, the treasure hunt is the main event of the party. Kids of all ages love the hunt, and your computer can add a new twist to this all-star activity. You'll want to do the preparation part alone, though, so your child can participate in the fun.

For this hunt, you make up clues written in code that will lead to the treasure. To create a code, type out all the letters of the alphabet in a row, leaving a space between each character. Next, directly underneath the first row, type out a row of letters, numbers, or symbols, so that each letter in the top line is "assigned" a new character. (You can also set up the characters in two columns.) For variation, try substituting symbols from fonts such as Zapf Dingbats or special typographical characters supplied with your word-processing program. Print up enough "translation" sheets for everyone.

Now devise five or six clues that the pirate crew can follow as a group, and translate them according to the code so that they are unreadable. Try using riddles such as: "Look under the sleeping giant that serves us regularly, has four legs, but can't walk" (Answer: A table). Once the party starts, pass out the first clues and translation sheets, and explain how the treasure hunt works. Let the kids know that this is a group activity in which they all have to solve the clues to get to the treasure. When the group finally makes its way to the last clue, it should be displayed in code on the computer screen. You might want to have the clue waiting "behind" a screen saver, buried in the "trash," or among files on the desktop.

**What you'll need**
**Software:**
*Word-processing program*

This riddle will lead to the treasure: an overflowing treasure chest (or a beautifully decorated cardboard box). If possible, "bury" it by stashing it among some plants. Stuff the chest with gold foil-covered chocolate coins, fun party favors and little toys, and perhaps a few more million-dollar bills for good measure. When the treasure is finally found, make sure everyone gets a fair share, just the way real pirates used to divide the spoils.

To spice up the hunt, you might want to set a timer and see if the treasure hunters can make their way to the treasure within twenty minutes. Suggest a pirate's bonus (a candy necklace) as special incentive for finishing the hunt within the time period. Scatter pirate paraphernalia, such as chocolate coins, near hidden clues to make treasure hunting easy and fun.

# ON-SCREEN ACTIVITIES FOR YOUR CREW

These two activities, which call for daring and a cool hand, keep pirate spirits high. Shark Bait is a variation on an old favorite. Blackbeard's Portrait is an artistic collaborative effort.

## Shark Bait

This activity is the modern pirate's version of "Pin the Tail on the Donkey," so call all hands around the computer and form teams. Using the mouse, blindfolded buccaneers take turns trying to rescue their team's mascot as it walks an on-screen plank.

To set up this activity, draw a ship, a plank, and a shark-infested sea before the party. In Kid Pix, create mascots using stamps and customize them with the drawing tool or other stamps. For instance, a penguin can be given sunglasses and a sword. For added fun, use the "Wacky TV" mode to insert an animation of a shark fin in the water, complete with scary music.

The game is played by blindfolding one player, who uses the mouse (use the "moving van" tool in Kid Pix to move the character) to rescue his mascot from becoming shark bait. The blindfolded player's team instructs him how to get to safety, which is marked by a grid drawn in the top, right-hand corner of the screen. Set up a ten-second timer to make the rescue even more suspenseful. If characters are not dragged to safety in time, it's *"Bon appétit, Monsieur Shark!"*

**What you'll need**

**Software:**
*Kid Pix with Companion by Broderbund or other drawing program*

## Blackbeard's Portrait

Now test your crew's artistic mettle: Have them create the most ruthless pirate ever to roam the high seas. What did that infamous rogue Blackbeard really look like? Besides being very tall, he had a long, black, bushy beard, and his hair smoked during battles. Your pirates can draw the rest.

Start by having one person draw a big oval for his face. Then, each child takes a turn adding features to the portrait. Encourage everyone to be inventive, adding a pirate hat, tattoos, a scar or two, or chipped front teeth. Of course, don't forget to add the beard and his unusual hair. When you're done, print out copies for everyone to take home. If you have some time, break out the crayons or markers.

**FamilyPC Tip**

**Typing with Kid Pix** *To turn Kid Pix into a mini-word-processing program, press the Option key (Mac) or Control key (DOS) while clicking on the text icon. Then select the type on the bottom tool bar, and click anywhere on the screen.*

# MAKING HEARTY, HIGH-SEAS GROG MUG LABELS

One of the best parts of any birthday party is when it's time for cake and punch, especially when you can toast the birthday boy or girl with a hearty, "Yo, ho, ho and a pitcher of grog!" Making customized grog mugs is a breeze. The key to a great label is to make the letters and images big. If you're only equipped with a word-processing program, type the name, experiment with the type size until it looks good, print the label out, and then add artistic decorations by hand.

If you have clip art or a drawing program, find an image that you like or create one for all of the grog labels. Perhaps the most effective image is four or five Xs in a row, denoting very potent grog, indeed. Make sure the alignment of the labels is centered, then above and below the Xs (or other image), type the words "Grog" or "Old Sailor's Brew," along with the birthday child's pirate name.

To attach the labels, use clear packing tape or clear contact paper cut slightly larger than the label size so that all sides are sealed. (It helps to keep the ink on the labels from running if the toasting gets a bit rowdy.)

Parade the crew into the kitchen where the captain's feast is set out, complete with party place mats (invitations sandwiched between oversized sheets of clear contact paper), pirate punch (pink lemonade and a spot of ginger ale), and all sorts of tasty treats.

Pass out the grog mugs so that they can be used when the pirates begin their wild toasts: "Here's to Greenbeard, the rottenest pirate on the planet" and "To the surliest treasure hunter of the seven seas." Suggest other rules of disorder as well: No utensils are allowed, and each request must be made in as raucous a manner as possible. "More grog, landlubber!"

After the birthday cake, ice cream sandwiches (a neat solution to the no utensils rule), candles, and presents, pass out any remaining party favors and treasure sacks (lunch bags will do). There can be no greater satisfaction for a party-weary pirate than to stow away his or her richly deserved booty and head off into the sunset in search of more adventure.

**What you'll need**

**Software:**
*Word-processing or drawing program*

**Optional Software:**
*Clip art*

**Other Materials:**
*Large plastic cups, crayons, colored pencils, markers, clear contact paper*

Steve and Ruth Bennett *are the authors of numerous family activity books, including* 365 TV-Free Activities You Can Do With Your Child *and* The Official Kid Pix Activity Book.

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NEC

# Hardware

## Good-bye TV, Hello Multimedia PC

*What kid could resist hunting with dinosaurs? Treat your family to a multimedia PC. We "family test" three of the best.*

By Frederic E. Davis

THE FIRST DAY our multimedia PC arrived, my ten-year-old son heard Mark Twain speak to him. Suddenly, history came to life, and the drudgery of working on a school report vanished.

Exploring what a multimedia computer can do is irresistible. In no time at all, my wife was combing a desert island for a missing person in a mystery game, my son was using crop rotation to make a simulated farm prosper, and we jammed together in a virtual rock-and-roll band. The fact that my wife and I manage all our finances on our computer fades a little by comparison, but it's no less important. We use our multimedia PC for everything.

And multimedia computers hold their own against television with the kids. A few clicks of the mouse and they're transported to a virtual zoo, around the world with Carmen Sandiego, or to the Oregon Trail, where they learn math while exploring the Old West. Your kids will be learning without even knowing it.

These PCs provide built-in high-fidelity sound with external speakers, a high-resolution display, and a fast CD-ROM drive. They also come outfitted with a software selection: along with educational and entertainment programs, you get reference works, home finance software, word-processing programs, and spreadsheets. Much of this software comes on CD-ROM discs — close cousins to the audio compact disc. Each CD-ROM can hold as much information as a bookshelf six feet tall and three feet wide!

**SPECIAL PREVIEW**

**Three hot new multimedia computers go head to head in this preview issue of FamilyPC. For the complete multimedia PC roundup, pick up FamilyPC's premier issue this September!**

### FamilyTested

Several leading manufacturers build family computers with all the right stuff. Choose well, and your kids will be engrossed in a CD-ROM educational game half an hour after you bring home the box. But there are literally hundreds of "multimedia PCs" for sale, and it's buyer beware. Some are under-

JOHN RUSSELL / TEAM RUSSELL (LEFT)

*Photographs by Lightworks Photographic*

Fre - re Jac - ques, fre - re Jac - ques,

## REPORT CARD
### Multimedia Personal Computer

To assess multimedia computers, **FamilyPC** rigorously tests and evaluates each model on seven criteria: Out-of-Box Experience, Software Bundle, Multimedia Power, System Performance, Design Quality, Warranty and Support, and Comparative Value. A score of 5 is excellent, while a score of 1 is poor. Relative Importance represents the degree of weight, or significance, given each criterion in the Overall Score.

The Overall Score quantifies all the test results, evaluation criteria, and judgments about individual models. The best possible score is 100.

| | | | TOP-RATED | |
|---|---|---|---|---|
| Relative Importance | Evaluation Criteria | Acer Acros 4581G | Apple Macintosh Performa 550 | Compaq Presario 633 CD5 200F |
| 10% | Out-of-Box Experience | 4 | 5 | 4 |
| 15% | Software Bundle | 4 | 5 | 3 |
| 15% | Multimedia Power | 4 | 4 | 3 |
| 15% | System Performance | 5 | 4 | 4 |
| 10% | Design Quality | 4 | 5 | 4 |
| 15% | Warranty & Support | 4 | 3 | 5 |
| 20% | Comparative Value | 5 | 5 | 4 |
| OVERALL SCORE | | 87 | 91 | 82 |

powered, or even missing essential pieces.

Since what's fun about multimedia personal computers is using them, not choosing them, *FamilyPC* takes the guesswork out by family-testing popular models. To arrive at our recommendations, we put each product through a rigorous evaluation program run by expert parents and kids, as well as through sophisticated laboratory tests.

For this preview issue, we tested three popular multimedia computers to find out which of them were best for families. The three systems — the Acer Acros 4581G, Apple Macintosh Performa 550, and the Compaq Presario 633 CDS Model 200F — sell in the range of $1,900 to $2,400 and include absolutely everything you need.

Computers are a bit like cars: models that look alike can have a bewildering array of options. But ordering a computer in an upgraded configuration is much simpler than ordering a car with power windows but no air conditioning. We recommend that you buy a multimedia computer with at least 8 megabytes (MB) of random access memory (RAM). Make sure that an IBM PC compatible has at least a 200MB hard drive or that a Macintosh has at least a 160MB drive.

*FamilyPC* starts with a minimum system configuration that takes into account the hardware your computer will need to properly run CD-ROM education, entertainment, and reference software, personal productivity programs (such as personal finance programs), and the business application tasks you might bring home from work. (For more on this, see "Buyers' Pocket Guide," on page 17.) Here are the criteria we use to evaluate each computer:

### Out-of-Box Experience

Just how easy is it to take a multimedia PC out of its box and assemble it? You're not alone if you're anxious about this part of the computer experience. You're a parent, not a technician. Some companies make it far easier than others. They place the unpacking and setup instructions on top where you'll find them when you first open the box. The instructions have pictures and don't require a degree in engineering to decipher. Cables and sockets with pictograms help you plug things into the right place. Setting up your new computer should be fun.

### Software Bundle

Most computers marketed for families come with a bundle of CD-ROM and original software that usually includes educational, entertainment, and personal productivity programs. Since all software bundles aren't created equally, we compare the number of programs, the value of each program to families, and the estimated dollar value if you had to buy them separately. You're buying a computer, but it pays to keep in mind that you're also buying a money-saving software starter kit.

### Multimedia Power

Until you get it home, it's hard to tell how well a multimedia computer will play sound and music, record your voice, and render video, animation, and graphics, particularly those on the new CD-ROM titles. For that, you need expert advice. *FamilyPC* evaluates multimedia software compatibility and the performance of the CD-ROM drive, sound system, and monitor.

### System Performance

The true test of a multimedia machine is how well it runs software — after all, that's the reason you are buying it. What makes software go is a great combination of the processor chip, the hard drive, the memory, and the video circuitry. To find out how well our review models perform, *FamilyPC* uses benchmarks that test every major component of a computer.

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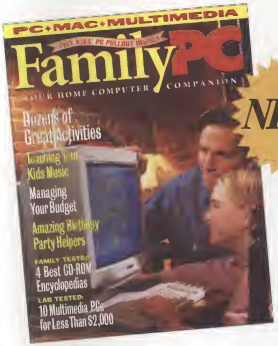


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- great bargains and deals
- a mini magazine created just for kids
- practical tips, problem–solving advice and more — see reverse side for further details!

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OPTIONAL: CHILDREN'S BIRTHDATES

☐ We own a computer ☐ We plan to buy a computer
☐ Macintosh ☐ IBM or PC-compatible ☐ Other

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☐ We own a computer ☐ We plan to buy a computer
☐ Macintosh ☐ IBM or PC-compatible ☐ Other

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# REASONS WHY YOU'LL LOVE FamilyPC

**1. WE'LL SHOW YOU HOW TO CHOOSE THE RIGHT COMPUTER FOR YOUR FAMILY.**
We'll help you find the computer that fits your whole family's needs — one that's compatible with work and school, has the right bells and whistles, and falls within your budget.

**2. WE'LL HELP YOU GET THE MOST OUT OF YOUR FAMILY'S COMPUTER.**
FamilyPC is filled with new ways for parents to use computers — from managing family finances to working out of your home. And you'll find the best education-related and entertainment programs and software for kids.

**3. WE'LL BRING YOU DOZENS OF CREATIVE PROJECTS FOR THE WHOLE FAMILY.**
From creating amazing birthday party invitations to writing hip-hop songs, FamilyPC is packed with imaginative art, music, writing, science, crafts and hobby projects you can do together!

**4. WE'LL TELL YOU ABOUT GREAT DEALS AND DISCOUNTS.**
We'll help you get more value for your money by showcasing the top bargains in mail order and retail. Whether you're buying new software or upgrading to a multi-media PC, we'll tell you where to get the best possible deal.

**5. WE'LL TEST AND RATE THE BEST COMPUTERS, SOFTWARE, ON-LINE SERVICES, GAMES AND GEAR.**
Every month our team of kids, parents and educators test the latest computer products and services to give you their top picks on everything from electronic encylopedias to voice software and CD-ROMs.

**6. IT'S READER-FRIENDLY.**
FamilyPC will make your whole family computer-literate — without using computer jargon and confusing technical terms. Every issue will be easy to understand and truly enjoyable to read.

**7. THERE'S A MINI MAGAZINE JUST FOR KIDS IN EVERY ISSUE.**
Created by kids, for kids, it's a place where your kids can submit their own computer art work, stories, gaming tips, silly computer tricks and more.

**8. THE PREMIERE ISSUE IS YOURS FREE!**
FamilyPC will help you and your family get more value, use and fun from your home computer. And the Premiere issue is yours FREE! But only a limited number of issues will be printed. So act now!

**SEND FOR YOUR FREE ISSUE TODAY!**

# FamilyTested Hardware

We also test with three well-known applications — Intuit's Quicken, a personal finance program; Microsoft Word, a word-processing program; and Fractal Design's Painter, a paint and image-manipulation package — to see how fast they load and run.

## Design Quality

Known as "ergonomics," the look and feel of a computer, the placement of the controls, the response of the keyboard, the fit of the mouse in your palm (and your child's), are important to how successfully your family will adapt to the new machine. Can you adjust the screen angle to suit your child? Will it fit on your desk, or is it a behemoth imposing on your home? Are all the controls and switches easy to reach and readily understandable? The system should also be easily expandable, so you can choose to upgrade it later with more RAM, a bigger hard drive, or a larger display.

## Warranty and Support

When your computer breaks, or you can't get it to work, it's nice to know just how well the manufacturer stands behind it. A one-year parts and labor warranty is common, and you shouldn't buy a computer whose warranty period is less. Some manufacturers offer longer warranties. And when you need technical support, it's important to know that the company is there with a toll-free number, evening hours, and lots of helpful technicians available to field your calls.

## Comparative Value

*FamilyPC* also rates machines by comparing everything you get in the package with how much they cost on average when you buy them discounted in a computer store. Our rating takes into account performance, the quality and estimated value of the bundled software, and specifications such as the CPU type, monitor, hard drive capacity, and amount of RAM, which carry a huge significance in assessing value. (See "Buyers' Pocket Guide" below for more specifics on CPUs.)

## Overall Score

To arrive at *FamilyPC*'s Overall Scores, we assess each computer on all of these points, giving greater emphasis to such important areas as the software bundle, performance, and comparative value. That way, you can be confident that a FamilyTested and recommended computer will be a welcome addition to your home.

Fred Davis *and his family live in the San Francisco area. He is a well-known author of numerous Windows and Macintosh articles, as well as* The Windows 3.1 Bible.

## BUYERS' POCKET GUIDE

### Minimum Specifications for Multimedia Computers

Since buying a multimedia computer can be almost as intimidating as shopping for a new car, we've gone to great lengths to make it easier for you. When your family is shopping for a multimedia computer, you can use this Minimum Specifications chart as your guide. Just ask the salesperson to verify whether models you're considering have what's shown on the list.

To be truly useful to your family, a multimedia computer should have 8 megabytes (M8) or more of random access memory (RAM), at least a 200M8 hard drive on IBM PC compatibles or at least a 160M8 drive on Macs, a "double-speed" CD-ROM drive, a 16-bit SoundBlaster or SoundBlaster-compatible sound card (Macs come with built-in sound, so sound cards aren't an issue), two speakers, and a barrel of great software. A microphone is also handy.

In IBM PC compatibles, the central processing unit (CPU), or main chip, should be a 33-megahertz (MHz) or faster 486SX, 486DX, 486DX2, DX4, or Pentium. Macintoshes should have at least a 33-MHz Motorola 68030, a 25-MHz or faster Motorola 68040, or any PowerPC CPU. The megahertz rating is an indication of how fast the computer runs, so higher numbers are better. The CPU numbers are the processor model names, and higher numbers usually indicate newer, more powerful chips. Pentium and DX4 are the most powerful IBM PC-compatible CPUs, and PowerPC is the fastest Macintosh CPU.

Double-speed CD-ROM drives are rated to transfer data from the disc to your computer at twice the rate of their predecessors. Large, over-200M8 hard drives are a bit faster than small hard drives, but the real advantage is in the extra storage space they provide. —*Scot Finnie*

| | IBM PC COMPATIBLES | APPLE MACINTOSHES |
|---|---|---|
| RAM | 8MB | 8MB |
| CPU (Processer/MHz) | 486SX/33 or DX2/50 | 68030/33 or 68040/25 |
| Hard Drive Size | 200M8 | 160M8 |
| CD-ROM drive | Double-speed | Double-speed |
| Sound | SoundBlaster 16 or compatible | Built-in |
| Speakers | Two speakers | Two speakers |
| Software Bundle | At least five applications of interest to your family | At least five applications of interest to your family |
| System Software | DOS 6.2 and Windows 3.11 or Windows for Workgroups 3.11 | System 7.1 or higher |

**Out-of-Box Experience:** 4
**Software Bundle:** 4
**Multimedia Power:** 4
**System Performance:** 5
**Design Quality:** 4
**Warranty & Support:** 4
**Comparative Value:** 5

**Average street price (with 8MB of RAM):**

**$2,300**

**Basic Specifications:**
**CPU:** *486DX2/50*
**Hard drive:** *420MB*
**RAM:** *4MB (upgrade to 8MB for $175)*
**Display:** *14-inch*
**CD-ROM drive:** *Double-speed*
**Sound:** *16-bit*

**Acer Acros 4581G**
Acer America Corp.
*2641 Orchard Parkway*
*San Jose, CA 95134*
*800-733-2237 or 408-432-6200*

**PROS:**
- Blazing 486DX2/50 processor
- Big hard disk
- Extra horsepower

*Snap-apart case*

**CONS:**
- Tiny, tinny speakers
- Skimpy instructions
- Hard to find at local stores

**Acer Acros 4581G**

# It's an all-around amazing multimedia PC value: The Acer Acros

*The Acer flies past the other models in most of our performance tests, showing off its multimedia power*

The Acer Acros 4581G is one of the best multimedia computer values we've seen. It has an attractively styled case and monitor, and if you ever need to install options, you just push aside four tabs and off pops the top. The Acros is easy to set up and comes with all its disk-based software preinstalled, although its setup instructions presume some familiarity with computers.

The Acer was noticeably faster than the other systems, scoring fastest on all but a couple of our performance tests. Its muscle comes from its 50-megahertz (MHz) 486DX2 processor, a real powerhouse that can tackle any computing task. Helping to make the Acros a great value is its generous 420MB hard disk, more than twice the size of the drives offered with the other models. Since the CD-ROM drive doesn't require a disc caddy, younger children will have an easier time inserting discs.

The Acros comes with a great selection of software, including Microsoft's Multimedia Works, an integrated software package that provides word processing, spreadsheet, and graphics. You also get the Microsoft Encarta Multimedia Encyclopedia CD-ROM and Microsoft's superb Cinemania movie review. There's also some other fun stuff from Microsoft: Sound Bits, Golf, and the Entertainment Pack. Intuit's Quicken for Windows rounds out the bundle. Acer includes an internal fax modem with fax software from Phoenix Technologies and starter kits for America Online and Prodigy.

The Acer Acros 4581G is an impressive multimedia PC value and comes with a generous 420MB drive

There are only a few shortcomings to the Acros. Its speakers offer poor sound quality and are awkward to adjust. You'd be better off plugging the machine into your stereo system or investing in a better set of accessory speakers (about $100 and up). It lacks a microphone, an item the other two models offer as standard equipment (about $25). And, although you can buy the Acros directly by phone from Acer, the company's products can be very difficult to find. (Call Acer to order directly or for a dealer near you.) All in all, though, this IBM PC-compatible model is a great find and worth searching for.

## Apple Macintosh Performa 550

# Top-rated Mac Performa 550 does everything well and costs less, too

*The Performa is easy to set up, offers up a software landslide, and looks great in your family room*

THE PERFORMA 550 holds its own against the Compaq, and it actually outperforms the zippy Acer on a few graphics-intensive tasks.

The Mac Performa 550 is the least expensive model of the three reviewed here. It's cheaper in part because it stints on hard disk capacity—it comes with only a 160MB hard drive. But that's less skimpy than it sounds. Since Mac software takes up less space on the hard drive than Windows software, a 160MB hard drive on the Mac is about comparable to a 200MB drive on an IBM PC-compatible machine.

True to Apple's renowned reputation for ease of use, the Performa is a breeze to set up, far and away the easiest of the tested models. When you open the box, the first thing you find is a placemat-size card with understandable instructions and useful illustrations that provide a cribsheet for system setup.

Another advantage of the Performa is its small size and pleasing one-piece design. It's not going to crowd your home office or family room. The integral 14-inch monitor provides the most crisp graphics display. And the speakers and microphone are built right into the case itself.

There's a downside to the compact one-piece design, however. If you decide to upgrade to a larger monitor, you'll wind up with two displays—one in your Mac, and one next to it.

Despite its name, the Performa 550 is a competent, not stellar, performer. It's roughly equivalent to the Compaq Presario 633 on most tests and is the fastest overall at loading applications. Even so, the Performa's 33-megahertz (MHz) 68030 processor represents older technology that's been optimized in this model for multimedia. So it beats the Compaq at multimedia performance, but it's no speed demon when running business software such as word-processing programs and spreadsheets.

The Performa 550 comes with the longest list of bundled software titles (see "The Fine Print on Multimedia Computers" on page 21), and more education and entertainment programs than the other systems. We estimate the value of this bundle to be $1,500. The friendliness, ease of use, great software bundle, and very reasonable price add up to a system that's sure to be a family pleaser.

The Macintosh Performa 550 delivers Apple's famous ease-of-use, and its all-in-one design makes it easiest to move from room to room

| | |
|---|---|
| **Out-of-Box Experience:** | 5 |
| **Software Bundle:** | 5 |
| **Multimedia Power:** | 4 |
| **System Performance:** | 4 |
| **Design Quality:** | 5 |
| **Warranty & Support:** | 3 |
| **Comparative Value:** | 5 |

**Average street price (with 8MB of RAM):**

**$1,950**

**Basic Specifications:**
**CPU:** *68030/33*
**Hard drive:** *160MB*
**RAM:** *5MB (upgrade to 8MB for $150)*
**Display:** *14-inch*
**CD-ROM drive:** *Double-speed*
**Sound:** *8-bit*

**Macintosh Performa 550**
Apple Computer, Inc.
*20525 Mariani Blvd.*
*Cupertino, CA 95014*
*800-776-2333 or 408-996-1010*

**PROS:**
- Easiest machine to set up and use
- A ton of great software
- Inexpensive

*Built-in speakers*

**CONS:**
- Processor not fast for business tasks
- Limited expansion with one-piece design
- CD-ROM caddy tough for kids to handle

**Out-of-Box Experience** ... 4
**Software Bundle** ... 3
**Multimedia Power** ... 3
**System Performance:** ... 4
**Design Quality:** ... 4
**Warranty & Support:** ... 5
**Comparative Value:** ... 4

**Average street price (with 8MB of RAM):**

**$2,365**

**Basic Specifications:**
**CPU:** *486SX/33*
**Hard drive:** *200MB*
**RAM:** *4MB (upgrade to 8MB for $215)*
**Display:** *14-inch*
**CD-ROM drive:** *Double-speed*
**Sound:** *16-bit*

**Presario 633 CDS**
Model 200F
Compaq Computer Corp.
*20555 S.H. 249*
*Houston TX 77070*
*800-345-1518 or 713-370-0670*

**PROS:**
- Excellent support and 3-year warranty
- Good resale value
- Superior speakers and a microphone

*CD-ROM bumps keyboard*

**CONS:**
- Limited software selection
- A little more expensive
- CD-ROM drive too close to keyboard

**Compaq Presario 633**

# The Presario's hallmarks are a great warranty and easy setup

*You'll pay a bit more for the Presario 633, but it's tough to put a price tag on peace of mind*

AN AVERAGE performer, the Compaq is on par with the Performa for general use, but lags behind on tougher multimedia chores.

The Presario 633 is backed by the best support policies of any of the computers we tested. Compaq's three-year warranty means fewer headaches if the computer breaks down. Plus, unlike the Acer, the Presario's speakers offer excellent sound quality, and it includes a microphone. The Presario comes with clear instructions and is easy to assemble.

Even so, you can't just turn the Presario on and start enjoying the software. Although the process is automatic, you must wait through a forty-five-minute setup of Windows and the bundled software. Family computers should come with all their software fully configured and ready to go. Another annoyance was the placement of the CD-ROM drive, which is located at the bottom front of the case. If you place the keyboard directly in front of the computer, the CD-ROM disc drawer will bump into the keyboard when it opens.

Performance also hurt the Presario in our evaluations. Powered by a 33-megahertz (MHz) 486SX processor, it's significantly slower than the 50-MHz 486DX2 chip in the Acer Acros, and about on par with the Performa 550 on most tests, except more demanding multimedia operations. Even so, it's fast enough to run your software properly.

**The Compaq Presario gives one of the best warranties in the business and easy-to-understand setup instructions**

The Presario comes with a good on-screen tutorial and help system. The modest selection of bundled software does not include a multimedia encylopedia, which the Apple and Acer do. We estimate the bundle's value to be only $300.

Athough it's a popular model from a well-known company, the Presario offers a bit less value for your money than the other two. On the other hand, Compaq dealers are everywhere, and the company's support policies are unequaled. If you're not much concerned with extra oomph for CD-ROM software and the resale potential of a name-brand computer is a plus, then the Presario 633 is a worthy choice.

## THE FINE PRINT ON MULTIMEDIA COMPUTERS

### Real-world pricing, the estimated value of bundled software, and all the trimmings

The three models tested here are admirable multimedia computers that will run the latest educational and multimedia titles. They each provide a 14-inch monitor and a double-speed CD-ROM drive. The similarities end there, though. Here's how they differ:

| | ACER ACROS 4581G | APPLE MACINTOSH PERFORMA 550 | COMPAQ PRESARIO 633 CDS 200F |
|---|---|---|---|
| Manufacturer | Acer America | Apple Computer | Compaq Computer |
| Phone number | (800) 733-2237 | (800) 776-2333 | (800) 345-1518 |
| Case design | Desktop case with separate monitor and speakers | One-piece unit with built-in monitor, speakers, and microphone | Desktop case with separate monitor and speakers |
| Availability | Direct mail and retail stores | Retail stores | Retail stores |
| List price | $2,125 | $1,999 | Not Available |
| Average street price | $2,125 | $1,800 | $2,150 |
| Standard RAM | 4MB | 5MB | 4MB |
| Cost to upgrade to 8MB | $175 | $150 | $215 |
| Standard hard disk drive | 420MB | 160MB | 200MB |
| Processor chip (CPU) | Intel 50-MHz 486DX2 | Motorola 33-MHz 68030 | Intel 33-MHz 486SX |
| Software bundle | Microsoft's Multimedia Works, Entertainment Pack, Productivity Pack, Encarta, Cinemania, Multimedia Golf, and Sound Bits; Intuit's Quicken; Phoenix Technologies' MicroFax; America Online and Prodigy starter kits | ClarisWorks, Intuit's Quicken, Apple's PC Exchange and At Ease, Paradigm's Best of Homework Template, T/Maker's ClickArt Performa Collection, Global Village's Teleport Global Fax, WordStar's American Heritage Dictionary, Interplay's Mario Teaches Typing, Velocity's Spectre Challenger, MECC's Super Munchers, Grolier's Encyclopedia, Compact Publishing's 1993 Time Magazine Almanac, Software Toolworks' The San Diego Zoo Presents the Animals!, Discis's Tales of Benjamin Bunny | Microsoft Works and Entertainment Pack, Delrina's WinFax Lite, Intuit's Quicken, Interactive Ventures' Mayo Clinic Family Health Book, Compaq Tabworks, America Online and Prodigy starter kits |
| Estimated value of software | $800 | $1,500 | $300 |
| Mouse type | Acer, two-button | Apple, one-button | Compaq, two-button |
| Microphone | No | Built-in | Yes |
| Fax modem speed (bps) | 2,400 data/9,600 fax | 2,400 data/9,600 fax (send only) | 2,400 data/9,600 fax |
| Caddyless CD-ROM | Yes | No | Yes |
| Sound card type | SoundBlaster 16 | Apple, built-in sound | SoundBlaster 16 |
| Toll-free Support | 24 hours, 7 days a week | 6-6 M-F; 8-6 Sat.; 8-5 Sun. PST | 24 hours, 7 days a week |
| On-line support | Acer BBS, America Online, Prodigy, CompuServe | America Online | Compaq BBS, CompuServe, Prodigy |
| Warranty | One year, on-site parts and labor | One year, on-site parts and labor | Three years parts and labor, one year on-site |

# WEATHER *Smarts*

*This forecast calls for fun! Three cool computer projects that teach your family all about the weather.*

By Peter Scisco

WHEN EARLY SUMMER brings thunderstorms to our area of North Carolina, my two oldest boys go out to the front porch swing and watch the black clouds roll in. To them, the flash of lightning against slate-gray sky, and the ensuing flood of rain, is an experience not to be missed. They want to know everything, from what clouds are to whether people can actually be blown to the Land of Oz.

Learning about weather is an irresistible and fascinating family activity, especially when you use your trusty PC — a veritable weather station. Just like professional weather forecasters, you can easily chart the telltale changes in conditions, create colorful forecasts for your family, and, using a modem, follow weather systems as they move across the country. Meteorology may be a science, but to your kids, it will seem like magic. So step right up and turn on your computer — the greatest show on earth is about to get even better.

## ELEMENTS *and their roles*

**Temperature** *is the measure of how hot or cold something is. When hot air masses meet cold air masses, they create wind. Temperature also influences evaporation and condensation.*

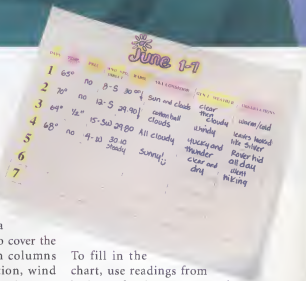
**Precipitation** *is rain, sleet, snow, or hail, and it can have a warming or cooling effect, altering weather. Dew and frost, also precipitation, don't fall from clouds, but occur when moist air comes in contact with colder objects on the ground.*

**Wind** *carries particles and moisture from one part of the sky to another. Jet streams (at 10,000 to 40,000 feet) can move at around 300 mph and have a profound influence on the weather.*

**Relative Humidity** *refers to the amount of water in the air at a given temperature.*

**Barometric Pressure** *is the force that air exerts on the earth. Falling pressure indicates a cool air mass moving into an area, which will bring storms when it meets warmer air. Rising pressure indicates clearing weather.*

WARREN-DUNLAP / INTERNATIONAL STOCK




# WEATHER DIARY

*Understanding the basic elements*

WEATHER is a constantly evolving phenomenon that can wash out a Little League game or provide the perfect backdrop for a family picnic. Since so many factors affect weather, extended forecasting is far from simple. However, by understanding the basic elements, making one- or two-day weather predictions is a cinch.

Elements such as temperature, wind speed, and barometric pressure are the building blocks of all weather conditions and the key to accurate forecasting. One great way to learn how the elements affect the weather is to chart local conditions on a daily basis. Using a word-processing program with table-making capabilities, you and your kids can create a weather diary. (You can also do this in a spreadsheet program, which is wonderful for creating charts.) Set up a table that has enough rows to cover the days of a week and enough columns for temperature, precipitation, wind speed and direction, barometric pressure, sky conditions, a general weather description, and special observations.

**What you'll need**

**Software:**
*Word-processing or spreadsheet program*

**Computer Skills:**
*Basic table-making or spreadsheet knowledge*

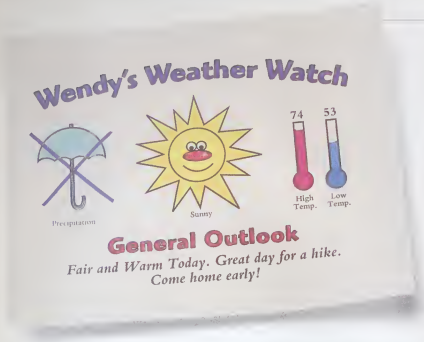
**Additional Materials:**
*Pens, markers, or crayons; simple weather instruments or weather reports*

This last column is where you note odd happenings, such as the time your dog acted strangely just before a big thunderstorm or the type of clouds that were in the sky before unsettled weather (see "Cloud Types" on page 25).

To fill in the chart, use readings from basic weather instruments such as a thermometer and a barometer (The Weather Tracker's Kit from Running Press features gauges for wind speed and direction, temperature, and rainfall and sells for about $18) or consult local forecasts. Eventually, you'll see that the elements and their changes move in fairly predictable patterns. You'll even start to anticipate the type of weather that will occur, and you may realize that your dog is a four-legged, flea-scratching, tail-wagging storm detector!

*Photographs by Jim Gipe*

AND LEARNING STORE OF NORTHAMPTON, MA




# FAMILY FORECASTER

*Keeping your family informed about weather on the horizon*

NOT EVERY parent has the time to watch the weather on the evening news, and you don't have to when your young weather enthusiast provides your family with a personalized weather advisory, complete with fun tips, neatly packaged and delivered to your pillow just before bedtime. A personal forecast is a rewarding activity for your child because she can present the important information she has gathered in an expressive way — one that combines crisp graphics and distinctive fonts on a single sheet of paper.

**What you'll need**

**Software:** *Drawing or word-processing program*

**Computer Skills:** *Basic drawing*

**Additional Materials:** *Pens, markers, or crayons; weather reports*

With your child, design the daily forecast's template (a form that allows you to input entries without having to create a new chart every day) using either a drawing program or a word-processing program. To start the project, create a neat title. Think of weather words that go with your child's name ("Wendy's Weather Watch"). The next step is adding the four basic elements to your forecast: precipitation, sky conditions, temperature, and general outlook. To do this, use your drawing program and create symbols to represent the first three elements. For the last part, general outlook, use text to describe the information: "Sunny and warm with little sign of change."

For precipitation, create an umbrella and include drops for rain and flakes for snow. (Add lightning or hail if it's in the forecast.) If the weather has no precipitation, put an X through the umbrella. Labels for sky conditions might include Sunny, Partly Cloudy, and Cloudy. The weather section in your newspaper or the television news is a good source for symbol designs that you can adapt for your forecast. Have fun with them — give your sun some sunglasses and a smile; just make sure the symbols are clear enough to express types of weather.

If you have a color printer, you can color your pictures on the screen. Otherwise, leave your drawings in outline form, print them in black and white, and apply color with markers, crayons, pens, or other craft supplies. (Glitter makes great-looking snow.)

Some tips about other symbols: a thermometer is an excellent symbol for temperature. Create one by making a circle for the thermometer's bulb, then use the rectangle or straight line tool to draw the sides. Draw two thermometers (just copy and paste your first one) to indicate the day's high and low temperatures. Consider using red for the high temperature and blue for the low. Type in the temperatures below the thermometers.

For the general outlook section, type in a short prediction for the next day's weather, which your child can get from observing the weather or from television, newspaper, or radio weather reports. Encourage her to describe the weather outlook with witty phrases. Hot and sticky summer weather could be dubbed "a bad hair day." (For this activity to work using only a word-processing program, design a layout, type in the necessary information, and manually draw in the graphic elements on the daily printouts.)

A few trials with your program will help your child develop a design that shows off her work, or you can use the one pictured here as a model. Just remember: no matter how beautiful the report, weather can be fickle to forecast. So double-check her work with a peek out the window. It might keep "a bad hair day" from getting worse.

# HEAVY WEATHER HEADQUARTERS

*Going on-line for up-to-the-minute weather information*

NEWS FLASH: "Tropical storm Ethel has just passed the Caribbean's Leeward Islands and is building in strength. A Hurricane Warning has been issued for the coastal region of the entire Gulf of Mexico. . . ." A hurricane, one of the most dramatic and devastating meteorological forms, is just one weather phenomenon you can track with your computer. Using a modem, you can access this information from a number of on-line services. You can find out if the sun is shining in California or what a storm heading over the Great Lakes looks like. Here's a sampling of what's available on the major services and how to get to the information.

## CLOUD TYPES

*Clouds are weather messengers. The shape, altitude, speed, and direction of a cloud all say something about approaching weather. Below are some common clouds, along with the weather they forecast.*

**Cumulus**
*Fair weather*

**Cirrus**
*Fair weather, but precipitation may follow*

**Cumulonimbus**
*Thunderstorms*

**Nimbostratus**
*Long period of rain, snow, or both*

## America Online

Finding weather conditions on America Online can be a bit tricky, but once you click on the News & Finance icon, you've struck weather gold. In this section, you can view Ski Reports, read Weather News for major U.S. and foreign cities, or download color Weather Maps. Unfortunately, you can't see these maps without special software. There is, however, a Weather Discussion Board where people talk on-line about the weather. This forum can be particularly useful if you're planning a trip and want to know from someone who lives there what recent weather has been like.

## CompuServe

While America Online and Prodigy have forecasts for larger cities, only CompuServe gives you the weather outlook for your hometown and the surrounding areas. If you are a CompuServe subscriber, type GO WEATHER (or select the Weather icon if you're using CompuServe Information Manager software). CompuServe also offers options for viewing or downloading a variety of maps.

## Prodigy

Prodigy also offers weather information and maps, but its resources are more limited than those on CompuServe or America Online. By clicking on the Weather/News button on the Prodigy welcome screen (or typing Jump Weather), you can view a variety of U.S. weather maps, as well as read the forecasts for sections of the United States and major U.S. and international cities. Although Prodigy lets you type in the name of the city you are interested in, your choice of cities is limited. Also, you can only view weather maps on screen.

**What you'll need**

**Hardware:**
*Modem (2,400-bps minimum suggested)*

**Software:**
*Communications software, an account with an on-line service*

**Computer Skills:**
*Familiarity with on-line services*

Peter Scisco, *the father of three boys, writes about the creative use of personal computers and software from his home in High Point, North Carolina.*

# Our children will grow up in a world we can only begin to imagine. They will have jobs that have not been invented yet. The child who is an 'information navigator,' who can wend his way around the computer, is the child who is best prepared to succeed in this exciting new world."

— Robin Raskin, "Parents, Kids, and Computers"

Because you want your children to have every advantage, help them become information navigators. Put a **Family PC**™ from Gateway 2000® in your home. The **Family PC** is the *affordable* multimedia personal computer that is totally equipped for navigation on the information highway. Although this "highway" is little more than a dirt road now, today's explorations will make your children seasoned travelers on the superhighway of tomorrow.

The **Family PC** comes with awesome software, a fast CD-ROM drive and a high-quality sound system so you can run the best programs and games with sound, pictures, animation and video. You can even play all your favorite music CDs on the **Family PC** with super stereo sound. You get a modem, too, and everything you need to connect with other computer users all over the world. Once you are connected, there's no limit to what you and your children can learn and do.

Perhaps best of all, the **Family PC** is from Gateway 2000. We're a Fortune 500 company and the nation's leading direct market manufacturer of personal computers. Located in South Dakota, Gateway 2000 is known for great prices on quality computers with friendly, down-home service.

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GATEWAY2000 FamilyPC

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- Intel® 66MHz 486DX2 Processor (upgradable to the Pentium™ OverDrive™ Processor)
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- 2400/9600 Data/Fax Modem
- 3.5" Diskette Drive
- 14" Color SVGA Monitor
- 101-Key Keyboard, Microsoft® Mouse & Joystick
- MS-DOS® & Windows™
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intel inside

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# Software

## Read All About It

*Kids, parents, and teachers choose their favorite reading programs*

Been to your neighborhood computer store lately in search of software for your favorite computer user? You probably found hundreds, maybe even thousands, of different titles and had no way of knowing which was most appropriate for your kid. Most software reviews, if you can find them, are written by adults who can't anticipate what kids really like. And, like other parents, you've probably discovered that an expensive program is worth little if your child uses it just once.

That's why *FamilyPC* has developed FamilyTested reviews. Each software title we rate will have survived the scrutiny of real kids (and their real parents), in their own homes, using their own computer equipment. To get the inside scoop on the best family software, we have enlisted the help of FutureKids, the world's largest franchised computer school. FutureKids' network of families includes 22,000 computer-savvy kids at 285 sites throughout the world.

For our first FamilyTested reviews, *FamilyPC* editors selected more than twenty reading programs for kids from among a profusion of packages on the market. We then matched the software with FutureKids students of appropriate age and home computer systems.

More than 100 testers — from FutureKids sites in Austin, Texas, Pacific Palisades, California, Louisville, Kentucky, Norwell, Massachusetts, Shrewsbury, New Jersey, and Exton, Pennsylvania — loaded, launched, and clicked their way through two programs each in their homes. They then reported their experiences on evaluation forms developed by *FamilyPC*'s editors in consultation with Jean Gallati, president of Youth Insights, the market research company that helped create the testing methodology for the popular T.O.Y. (Toy of the Year) Awards for *FamilyPC*'s sister publication, *FamilyFun*.

**SPECIAL PREVIEW**

**These are the first FamilyPC FamilyTested reviews — software rated by real users based on real home experiences. In FamilyPC's September premier issue, FamilyTested will review reading and writing programs, the latest multimedia CD-ROM encyclopedias, and more.**

This happy gang of FutureKids students from Louisville, Kentucky, was part of our expert panel of FamilyTested reviewers

## Rating the Software

While individual evaluations provide valuable insights, it's not until we analyze the collective results that we come up with FamilyTested scores for distinct categories. These scores are then combined to determine a program's overall score. A score of 100 is top — nearly impossible to achieve. An overall score greater than 90 signifies an exceptional program.

FamilyTested rating criteria will vary according to the category of software we test. The educational software featured in this issue is rated on the following:

**Fun** As you might expect, this score — based on how enjoyable and captivating a program is — holds a lot of weight in a program's overall value.

**Graphics** This score rates the quality and appeal of a program's visuals, including photos, drawings, animations, video, and on-screen letters.

**Sound** Music, sound effects, and speech are the three main components of this score. Testers rate the quality and clarity of a program's sounds and how fun they are to listen to.

**Ease of Use** How well a user — especially a young child or an adult just learning to use a computer — can interact with a program is an important part of its overall value. This category considers a program's interface (including its points of entry, navigational tools, and feature controls) and its intuitiveness (how easy it is to get started and then figure out the next step).

**Help** This score represents the support resources available to you. The clarity of instructions in the program's documentation and on-line help, the company's technical support, and the complexity of the installation process are all factors.

**Replay Value** A program's lifespan is not necessarily related to how much fun it is to use at first pass. Only by looking at software over a length of time can you assess its long-term value — as any parent who has spent $40 on a CD-ROM that gathers dust after two weeks can attest.

**Learning Value** We turn to FutureKids teachers to rate a program's educational value. Components include a program's curriculum design, age-appropriateness, and long-term learning value.

The two titles presented here — Edmark's Bailey's Book House and Brøderbund's Arthur's Teacher Trouble — were the top choices in the pre-K to first-grade and the first- to third-grade age groups, respectively. In *FamilyPC*'s September premier issue we'll review more reading and writing programs, as well as multimedia CD-ROM encyclopedias.

So keep your eye on FamilyTested. With help from our nationwide panel, *FamilyPC* will pinpoint the very best software titles available — wholeheartedly recommended by families like yours.

*— Kurt Carlson and Bob Domine*

JOHN LAIR & ASSOCIATES, INC.

| | |
|---|---|
| **Fun:** | **95** |
| **Graphics:** | **91** |
| **Sound:** | **88** |
| **Ease of Use:** | **87** |
| **Help:** | **86** |
| **Replay Value:** | **93** |
| **Learning Value:** | **91** |

**$49.95**
**Platform:** *Mac or PC*
**Format:** *Disk or CD-ROM*

**Minimum PC requirements:**
**CPU:** *IBM PC or compatible*
**O/S:** *DOS 3.1*
**RAM:** *640K*
**Disk:** *9.1MB or CD-ROM*
**Monitor:** *VGA or EGA*
**Sound Card:** *Required for enhanced speech*
**Mouse**

**Minimum Mac requirements:**
**CPU:** *Mac Plus*
**O/S:** *System 6.0.7*
**RAM:** *1.5MB (for color)*
**Disk:** *5.5MB or CD-ROM*
**Monitor:** *Color or monochrome*

Edmark Corp.
*800-426-0856 or 206-556-8400*

**Ages 3 to 6**

# Bailey's Book House

*Delightful wackiness entices early readers to explore words and storytelling*

BAILEY is a cool cat who lives in a fun-filled house that is designed to charm your three- through six-year-old into exploring the mysteries and joys of reading. Judging by the responses from the kids, parents, and teachers in our FamilyTested network, Bailey's plan is a resounding success. This is shown by the scores they gave the program in the Fun, Replay Value, and Learning Value categories.

"I liked everything about this program," said five-year-old Jennifer Isaacson from Santa Monica, California. Kyle Mangione, four, of Austin, Texas, was more specific in her affection for Bailey's place: "I learned how to make a story," she announced.

Kyle achieved this milestone in Make-A-Story, one of Bailey's five Book House activities. Bailey's delightfully wacky sense of humor shines through in this activity, in which kids create a four-sentence story by choosing a subject, mode of transportation, destination, and activity to perform upon arrival. The program animates the screen and reads the story out loud in children's voices as kids create each sentence.

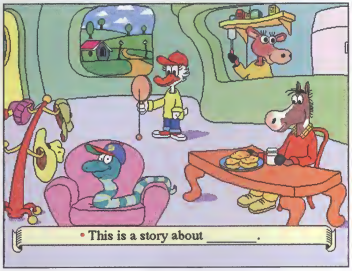
Bailey also teaches kids that words on a computer can be mixed with pictures and then printed. This aspect of Bailey's Book House, which is featured in the Kid Cards activity, drew the loudest applause from our testers. In Kid Cards children can design twenty-one different cards — using supplied clip art and phrases — and print out their final creations.

Although Bailey's shortcomings are slight, the FamilyTested reviewers gave it a score of 86 for Help, a category that includes installation, documentation, on-line help, and technical support.

Some testers had trouble printing from Macintosh machines. A call to Edmark technical support solved the problem. The solution is to turn off Background Printing by clicking a button in the Chooser. (A simple mention in the next Book House manual would save future buyers a technical support toll call.)

Bailey's simple point-and-click interface makes navigating the program a breeze for kids and adults alike. "I really appreciate the adult prompt key — what a great idea!" said Marion Douglas, mother of five-year-old Joseph Delarosa of Austin, Texas. Douglas was referring to the keyboard shortcut that calls up help screens and options for customizing Bailey's Book House, such as turning printing on or off or changing the keyboard layout.

Linda McElvenny, a teacher in Exton, Pennsylvania, summed up the general response of our testers to the program: "It's educational, age-appropriate, and fun!"




**Bailey's Make-A-Story activity was a big favorite among our youngest group of testers**

**Ages 4 to 10**

# Arthur's Teacher Trouble

*Inventive graphics and mischievous wordplay make this school a favorite*

ARTHUR'S TEACHER TROUBLE was one of the first titles in Brøderbund's Living Books series, and it continues to be an all-time favorite among young readers. Living Books are interactive CD-ROMs that let children four through ten explore reading in an engaging and familiar environment: the storybook.

Arthur's Teacher Trouble, based on an original book by Marc Brown, recounts the story of Arthur the mouse who discovers that he has "The Rat"— the infamous Mr. Ratburn — for his third-grade teacher. Then, on top of everything, Arthur finds himself representing his class in the schoolwide spell-a-thon. If he can't spell a certain eleven-letter word correctly, he'll be in big T-R-O-U-B-L-E.

The plot tells only half the story of this classic CD-ROM title. As Jessica Manson, eight, of Austin, Texas, discovered, "There are all kinds of neat things to click on!"

Arthur screens are filled with hot spots that encourage point-and-click exploration. Click on the school bell and it rings. Click on Mr. Ratburn's staid green jacket and it changes into a succession of outrageous designs. Click on two cans on the back of a stove and they do the can-can. A soaring Graphics score shows how much kids liked this part of the program.

Your child can click on the text, too, and it is pronounced in either English or Spanish. Valerie Battcher, a teacher in Louisville, Kentucky, thought the story "read a little slow," but overall she felt Arthur could "provide hours of learning and entertainment."

Joshua Hurwitz, aged six, of Los Angeles, liked the program's ease of use, as did nearly all of the home testers. "I can use it without help," he remarked with pride.

A pleasant dose of skills-based learning comes when Arthur studies for his spelling bee. Each word is spelled out and illustrated with an animated graphic. "I learned how to spell some words I didn't know before," said Teresa Grasso, eight, of Exton, Pennsylvania.

Pleased for another reason was Louis Swaab of Austin, Texas, father of Hannah, seven. "Including the book with the CD is an excellent idea," he said. The illustrated paperback provides an activity away from the computer, as well as a link to it.

Swaab was one of the few reviewers, most of them using PCs, who ran into trouble installing Arthur. Swaab said that once he freed up memory using the Windows SmartDrive function, installation was easy.

Philip Bishop, *who compiled these reviews, is a writer and graphic designer who lives with his wife and four children in Narragansett, Rhode Island.*

**Arthur's Teacher Trouble combines a twenty-four-screen storybook with more animated hot spots than you can shake a mouse at**

| | |
|---|---|
| **Fun:** | 90 |
| **Graphics:** | 97 |
| **Sound:** | 94 |
| **Ease of Use:** | 97 |
| **Help:** | 86 |
| **Replay Value:** | 92 |
| **Learning Value:** | 83 |

**$40.00**
**Platform:** *Mac or PC*
**Format:** *CD-ROM*

**Minimum PC requirements:**
**CPU:** *IBM PC 386SX or compatible*
**O/S:** *Windows 3.0 with Multimedia Extensions, MS/PC-DOS 3.3*
**RAM:** *4MB*
**Disk:** *CD-ROM*
**Monitor:** *SuperVGA*
**Sound Card:** *Sound Blaster or compatible, ProAudio Spectrum/16, ThunderBoard, Tandy MPC Sound*
**Mouse**

**Minimum Mac requirements:**
**CPU:** *LCII series*
**O/S:** *System 6.0.7*
**RAM:** *4MB*
**Disk:** *CD-ROM*
**Monitor:** *256-color*

**Brøderbund:**
*800-521-6263 or 415-382-4567*

WHO STARRED IN THAT MOVIE THUMBS UP OR THUMBS DOWN DID IT WIN AN OSCAR HE SURE LOOK

THIS LETTER STANDS OUT NOW NEW LOGO USE THE DATABASE GET THE SPREADSHEETS TOGETHER THESE GRAPHICS ARE EASY

# Inactive

*Why let your kids veg out in front of the tube when there's a whole lot more than rock & roll inside every AcerAcros multimedia PC.*

*Electronic Entertainment chose the AcerAcros as the clear price/performance leader... "When it comes to bang for the buck, the AcerAcros has what it takes."*

SEVEN WONDERS OF ANCIENT CIVILIZATIONS DOES MYTHOLOGY RELATE TODAY HOW DO YOU SAY

YOUNG HOUSTON DIRECTED THAT ONE LOVE THOSE WESTERNS WHAT A GREAT LINE MAKE MY DAY

ELECTRIC GUITAR STARTUP COOL NOW BALALAIKA FOR OPENING APPLICATIONS DIDGERIDOO BYE BYE BEEPS REAL MUSIC TO MY EARS

# Interactive

## *Smart Kids Need Smart Tools.*

*With the AcerAcros 4000G, you get a fast 486-based system with CD-ROM drive, stereo speakers and plenty of room to store all your stuff. You also get Encarta,™ the world's best-selling on-line encyclopedia, and SoundBites,™ Cinemania,™ Golf, and more cool software.*

## ACER INTRODUCES THE HOME PC THAT STRETCHES YOUR MIND, NOT YOUR BUDGET.

Packed with software that comes to life through sight and sound, the AcerAcros 4000G multimedia PCs give your kids the advantage they need to stay ahead of the curve. And you'll love how all the great software will help you with the grown-up stuff too!

No one else offers such a complete package at such an affordable price. When it comes to value and quality, you can't beat Acer.

ACER

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T IN URDU WHY ARE AUSTRALIAN ANIMALS SO DIFFERENT IS THE UNIVERSE REALLY EXPANDING

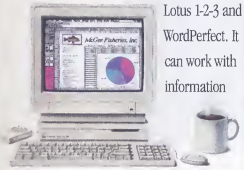
The typical business PC requires at least some knowledge of complicated computer codes. Serious? Yes. Fun? Hardly.

All it takes is a path command error or an AUTOEXEC.BAT file to send you or your kids back to reruns on TV.

The typical business computer simply wasn't designed for families to use — so Apple went ahead and invented one that is: Apple® Macintosh® Performa.™

*It's a serious business computer.*

Performa has all the power to run thousands of business programs, such as Lotus 1-2-3 and WordPerfect. It can work with information from a standard business PC™ or a Macintosh, so it's easy to bring work home from the office.




*Performa runs serious business software like Lotus 1-2-3, so you can get serious work done in the comfort of your home.*

But with Performa, there are no codes to confuse you. Writing memos, reports or proposals is easy. Managing your household finances and keeping tabs on the stock market are, too. In fact, Performa makes it easier to get more done, and that's serious business.

*It's a serious fun computer.*

Performa comes with extraordinary sound and video capabilities, as well as a talent for stunning graphics.

So, unlike boring business computers, it can play games that are nothing less than spectacular. It also runs hundreds of thoroughly captivating learning programs. (Remember, more schools use Apple computers than any other kind.)

But Performa is a tremendous value as well. One affordable price includes all the software your family is likely to need and, in some models, even a fax/modem. It also includes direct Apple toll-free phone support and a full year of in-home service.

*Plug in an AppleCD™ 300 drive, and your family can use the latest multimedia learning software. Add the AppleDesign® Powered Speakers for even better sound quality.*

So with Performa, your whole family is sure to get the most enjoyable power on earth. The power to be your best.™

# Can a serious business computer be fun to use?

Performa

The Family Macintosh

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TRUE COLOR, HIGH RESOLUTION

# Video Cards: A Look from the High End

Your eyes can discern about 16 million colors, give or take a taupe or tangerine. That's reason enough to demand a 24-bit (or true-color) video card, particularly if you spend a lot of time working with graphics. If you invested in a 17- or 21-inch monitor, it's a must. Two years ago true-color cards cost as much as a decent PC. Today you can buy one for well under $1,000—substantially less than a big monitor—and prices are still dropping.

Because fuzz grows annoying quite quickly, you'll want your video card to produce its 16 million hues at high resolution—at least 1,024-by-768-pixels. Better cards can produce high color, or 65,000 hues at even finer resolutions of 1,280 by 1,024, and 256 colors at very high resolutions of 1,600 by 1,280. While you're grappling with resolution issues, remember that flickering shortchanges great video. Make sure your card supports at least 72Hz vertical refresh rates at all resolutions (76Hz is even better).

The only way to get thousands or millions of high-resolution colors on the screen at one time is with memory on the video card—gobs of it. You'll want at least 2MB of video RAM (VRAM) right on the board, and 4MB is preferable. Avoid cards that use plain-Jane dynamic RAM (DRAM), which is cheaper but slower.

As long as we're talking performance, for Windows applications, a fixed-function video accelerator chip will keep screen redraws up to snuff. For both Windows and DOS applications, however, you'll want a full-fledged graphics coprocessor for great performance. Remember to plug that card into a fast bus: True-color cards now appear in both VL-Bus and PCI versions. If you have an older system, don't fret—there are still plenty of ISA and MCA 24-bit cards available.

Whichever card you buy, make sure it also has onboard VGA support so that you don't need an extra VGA card. Drivers for your particular operating system should be included, as should a utility for switching resolutions. Look for extras that better cards now include: Autoinstallation and mode-switching utilities, virtual screens, and hardware cursors are good places to start. MARTY JEROME

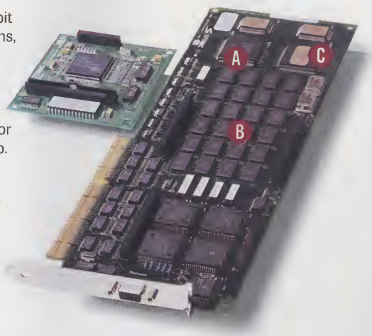
## 24-BIT VIDEO CARDS

GET AT LEAST **1,024 BY 768 PIXELS** AND 72HZ REFRESH RATE

**A. Graphics processor:** For 24-bit Windows applications, a fixed-function processor; for 24-bit DOS apps, a full-fledged graphics coprocessor like the TI34020 chip.

**B. RAM:** 4MB of VRAM (not DRAM).

**C. VGA support:** Onboard VGA chip.




**Resolutions:** 1,024 by 768 or higher.

**Colors:** 16.7 million colors at 1,024-by-768 or 1,152-by-870 resolution.

**Vertical refresh rates:** 72Hz at all resolutions.

**Drivers:** For Windows 3.1 and your specific DOS applications.

**Features and options:** VL-Bus, PCI, or EISA models; Windows utility to switch resolutions and colors.

**Other requirements:** Two-year warranty; free driver updates via CompuServe, BBS, or mail.

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| Insight | 298 | 24 Hours | 800-927-3159 |

## NETWORK SERVERS

**CPU:** Intel 486DX2/66, 486DX4, or Pentium.

**RAM:** 16MB expandable to 128MB.

**CPU RAM cache:** 256K.

**Display:** 14-inch Super VGA color or monochrome.

**Video card:** Super VGA with 512K of RAM.

**Hard drive:** 1GB SCSI-2.

**Bus:** Eight EISA slots with two VL-Bus or PCI.

**Drive bays:** Two full-height 5¼-inch, two half-height 5¼-inch with front-panel access, two 3½-inch.

**Features and options:** RAID-5, DAT backup, uninterruptible power supply, dual-speed CD-ROM drive, built-in SCSI-2 controller, Ethernet controller, protected power switch to prevent accidentally turning the power off.

**Other requirements:** FCC Class A or better, UL listed.

**RED FLAGS: Systems with ISA bus or slotted RAM are less upgradable. Database and other application servers need more CPU power than a file server.**

## MIDRANGE DESKTOP SYSTEMS

**CPU:** Intel 486DX2/66, 486DX4, or Pentium.

**Secondary cache:** 256K four-way set-associative.

**Memory:** 8MB, expandable to 32MB, 36-pin SIMMs.

**Floppy drive:** 3½-inch.

**Hard drive:** 400MB or larger IDE or SCSI-2.

**Video:** VL-Bus or PCI Windows accelerator, 15-inch monitor or larger with 72Hz refresh at 1,024 by 768 pixels.

**Slots:** Eight ISA slots for full-sized case (including two VL-Bus or PCI), three ISA slots for small-footprint case with integrated VL-Bus or PCI video and drive.

**Drives and bays:** One 3½-inch 1.44MB and one 5¼-inch 1.2MB floppy drive, five half-height 5¼-inch bays.

**Features and options:** Dual-speed or faster CD-ROM drive, sound card or built-in sound capability, two parallel ports, two COM ports, plus keyboard and mouse ports.

**RED FLAGS: Watch for Pentium-upgradable systems that don't include a ZIF socket, secondary CPU cache, and lots of slots for extra RAM.**

## SUBNOTEBOOK PCS

**CPU:** Intel 33MHz 486SX.

**Display type:** 7½-inch backlit passive, dual-scan passive, or active-matrix LCD.

**Weight:** 4 pounds or less.

**Size:** Smaller than 8½ by 11 by 2 inches.

**Keyboard:** 90 percent of full-sized keyboard.

**RAM:** 4MB, expandable to 16MB.

**Hard drive:** 80MB or larger.

**Features and options:** Removable hard drive, high-speed internal fax modem, integrated pointing device, infrared keyboard connection.

**Other requirements:** External floppy, at least one Type II PCMCIA slot, small recharger (5½ by 3 by 1½ inches or smaller).

**RED FLAGS: Subnotebook displays and keyboards entail compromise—try before you buy, or make sure there's a money-back guarantee with no restocking charge. In addition, many subnotebook batteries run down quickly—particularly when you're using color. Make sure the battery is easy to replace. User-installable RAM is also a plus.**

## NOTEBOOK PCS

**CPU:** 33MHz 486.

**Display type:** 9½-inch or larger backlit dual-scan passive- or active-matrix color LCD with accelerated local bus. Look for adjustable contrast and brightness controls.

**Weight:** Less than 7 pounds without AC adapter; total traveling weight less than 9 pounds.

**Size:** Smaller than 10 by 12 by 2 inches.

**RAM:** 8MB, expandable to 20MB.

**Hard drive:** 120MB.

**Ports/slots:** Parallel, 9-pin serial, PS/2 ports; one PCMCIA Type III slot or two Type II slots.

**Features and options:** Ability to swap out floppy drive for second battery, removable hard drive, user-installable RAM, integrated pointing device, Pen pointing device and touch screen can be useful in some instances. Watch for notebooks that support new Duracell standard-sized rechargeable batteries.

**Other requirements:** Standby mode, pop-up battery gauge, 6-by-3-by-3-inch (or smaller) battery recharger.

## ETHERNET ADAPTERS

**Card type:** 16 bit, ability to autoconfigure to 8 bit.

**Network support:** NetWare, LAN Manager, LAN Server, Windows for Workgroups, Windows NT Advanced Server.

**Drivers:** Support for NDIS and ODI drivers, or Eagle NE2000–compatible drivers.

**Media connectors:** For 10Base-2 (Thinnet) and 10Base-T (RJ-45); automatic sensing of media configuration.

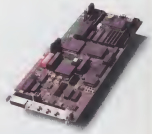
**Installation:** Should be software configurable and support interrupt levels above IRQ 7.

**Features and options:** Upgradable boot PROM, SNMP support, collision and link status LEDs, bus-mastering interface, built-in virus scanning, downloadable flash boot PROM, 10BASE-5 (thick Ethernet) connector, full-duplex Ethernet support.

**Other requirements:** Diagnostic utilities, slot-bracket mounted, transmission and reception LEDs, 16K or larger buffer.

**RED FLAGS:** Cards that support only 8-bit buses can restrict CD performance.

## SOUND CARDS



**Compatibility:** Sound Blaster.

**Mode:** Stereo.

**Card type:** Internal.

**Sampling capability:** 8- and 16-bit record and play (MPC 2 standard).

**Maximum sampling rate:** 44.1kHz.

**Synthesizer:** Wave or FM with Wave option.

**Voices:** 16 simultaneous in Sound Blaster mode, 24 in Roland.

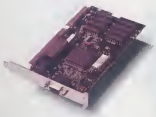
**Bundled software:** Windows and DOS utilities for playing, recording, and editing digital and MIDI files.

**Ports:** Speaker, microphone, and joystick.

**Features and options:** Programmable digital signal processor (DSP), SCSI port for a CD-ROM drive, QSound Virtual Audio microphone, powered speakers, bundled software that supports OLE 2 so you can easily embed sounds in documents.

**RED FLAGS:** Cards that play but can't record 16-bit sound or have a proprietary (non-SCSI) CD-ROM interface may be less useful.

## WINDOWS ACCELERATOR CARDS



**Resolutions:** 1,024 by 768 pixels; 1,280 by 1,024 for 20-inch monitors.

**Colors:** 256 colors at 1,024-by-768 resolution for business apps; 65,000 colors (or more) at 1,024 by 768 for near–photo-quality images.

**Accelerator chip:** Fixed-function chip such as S3 Vision 964, IIT AGX014, or ATI 88800 (Mach 64).

**Vertical refresh rates:** 72Hz or higher at all resolutions.

**RAM:** 1MB for 256 colors at 1,024 by 768; 2MB or more for higher resolutions and more colors. Choose VRAM over DRAM for more than 256 colors and high (72Hz) refresh rates.

**Features and options:** VL-Bus or PCI model option, Windows utility that can switch resolutions and colors.

**Other requirements:** Driver installation software, two-year warranty, Windows 3.1 drivers, free driver updates via BBS, CompuServe, or mail.

**RED FLAGS:** Interlaced boards and boards with 70Hz (or lower) vertical refresh rates produce more flicker.

## WINDOWS DISPLAYS

**Size:** 17 inches, 20 to 21 inches for graphics applications.

**Resolutions:** 1,024 by 768; 1,280 by 1,024 for 21-inch monitors; some now support 1,600 by 1,280; noninterlaced.

**Dot pitch:** 0.28mm or smaller for 17-inch monitors, 0.31mm or smaller for 21 inch.

**Vertical refresh rate:** 72Hz or higher at all resolutions.

**Tube type:** Flat-square or Trinitron.

**Controls:** Front-panel or onscreen digital controls.

**Features and options:** Support for MPR II low-emissions standards, compliant with EPA Energy Star requirements. Some monitors enable you to save settings for different resolutions and refresh rates. For 21-inch monitors, 1,600-by-1,200-pixel resolution.

**Other requirements:** Adjustable tilt-and-swivel base, video cable, antiglare coating or add-on filter, color controls, microprocessor-based controls.

**RED FLAGS:** Monitors with dot pitch above 0.31mm may seem fuzzy. Make sure the monitor supports the resolutions and particularly the refresh rates of your video card.

# MEMORY SUPER SOURCE

**LIFETIME* WARRANTY 100% GUARANTEED**

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## Seagate

FACTORY NEW – 1 – 5 YEAR WARRANTY

| | | |
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| **IDE** | | |
| 130MB ST3145A | 15MS 3 5X1" | $ 178 |
| 128MB ST9145AG | 16MS 2 5" | 299 |
| 260MB ST3290A | 16MS 3 5X1" | 220 |
| 340MB ST3390A | 12MS 3 5" | 275 |
| 209MB ST9235AG | 16MS 2 5" | 379 |
| 452MB ST3550A | 12MS 3 5X1" | 360 |
| 540MB ST3655A | 12MS 3 5" | 432 |
| **SCSI** | | |
| 457MB ST3550N SCSI-2 | 12MS 3 5X1" | 475 |
| 525MB ST3600N SCSI-2 | 11MS 3 5X1" | 499 |
| 343MB ST3390N SCSI-2 | 12MS 3 5X1" | CALL |
| 1420MB ST41650N | 15MS 3 5X1" | 1035 |
| 1350MB ST41600N | 12MS FH | 1559 |
| 1 2GB ST11200N SCSI-2 | 10MS 3 5" | 800 |
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| 2 1GB SE42400 SCSI-2 | 11MS FH | 1559 |
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| 1.7GB BARRACUDA-I ST11950N SCSI-2 | 3 5" | 1477 |
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| 2 2GB ST12400N SCSI-2 | 12MS 3 5" | 1395 |

## Maxtor

FACTORY NEW – FULL WARRANTY

| | | |
|---|---|---|
| **IDE** | | |
| 130MB 7131A | 14MS 3 5X1" | 185 |
| 213MB 7213A | 15MS 3 5X1" | 205 |
| 245MB 7245A | 15MS 3 5" | 229 |
| 345MB 7345A | 15MS 3 5" | 229 |
| **SCSI** | | |
| 345MB 7345S SCSI-2 | 12MS 3 5" | 385 |
| 540MB 540S | 8MS 3 5X1" | 571 |
| 1 2GB 1240S SCSI-2 | 8MS 3 5" | 1245 |

## CONNER

FACTORY NEW – 1 YEAR WARRANTY

| | | |
|---|---|---|
| **IDE** | | |
| 170MB CP30174E | 17MS 3 5X1" | $ 179 |
| 212MB CP30204 | 12MS 3 5X1" | 205 |
| 250MB CP30254H | 14MS 3 5" | 228 |
| 340MB CP30344 | 14MS 3 5X1" | 271 |
| 540MB CP30544 | 10MS 3 5X1" | 449 |
| **SCSI** | | |
| 540MB CP3540 SCSI-2 | 10MS 3 5" | 571 |
| 1GB CP1060S SCSI-2 | 10MS 3 5" | 812 |

## WESTERN DIGITAL

FACTORY NEW – 2 YEAR WARRANTY

| | | |
|---|---|---|
| **IDE** | | |
| 212MB WD2200 | 12MS 3 5X1" | $ 225 |
| 250M6 WD2250 | 14MS 3.5X1" | 242 |
| 340MB WD2340 | 12MS 3.5X1" | 295 |
| 420MB AC2420 | 13MS 3 5X1" | 370 |
| 540MB WD2540 | 11MS 3 5X1" | 495 |

## TOSHIBA

5 YEAR WARRANTY ON 3 5"
1 YEAR WARRANTY ON 2 5"

| | | |
|---|---|---|
| **SUPERFAST SCSI-2** | | |
| 130MB N/A | 17MS 2 5" | $299 |
| 200MB IDE MK2224 | 17MS 2 5" | 418 |
| 200MB SCSI MK2224 | 17MS 2 5" | 439 |
| 340MB IDE MK2326 | 2 5" | 588 |

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| 1MB X 9-80NS 9 CHIP SIMM | 46 | 1MB X 8-70NS SIMM | 45 | 256K X 9-60NS SIPP | 23 |
| 1MB X 9-70NS 3 CHIP SIMM | 42 | 4MB X 8-80NS SIMM | 150 | 256 X 36 – 1MB | 50 |
| 1MB X 9-70NS 9 CHIP SIMM | 48 | 4MB X 8-70NS SIMM | 165 | 512 X 36 – 2MB | 85 |
| 1MB X 9-60NS 3 CHIP SIMM | 44 | 1MB X 9-100NS SIPP | 45 | 1 X 36 – 4MB | 175 |
| 1MB X 9-60NS 9 CHIP SIMM | 50 | 1MB X 9-80NS SIPP | 51 | 2 X 36 – 8MB | 375 |
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| 16MB X 9-70NS SIMM | 770 | | | | |

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| 386DX-33-256K CACHE W/CPU | CALL |
| 386DX-40-64K CACHE W/CPU | CALL |
| 386DX-40-256K CACHE W/CPU | CALL |
| 486SX-25-64K CACHE W/CPU | CALL |
| 486DX-33-64K CACHE W/CPU | CALL |
| 486DX-33-256K CACHE W/CPU | CALL |
| 486DX-50-256K CACHE W/CPU | CALL |
| **OCEAN** | |
| JAGUAR 386DX-40 8-ISA, 8-30P | CALL |
| 486SX-25 8-ISA 33VLB DCA CACHE 8-30 | CALL |
| 486SX-33 6-ISA 3VLB DCA CACHE 8-30P | CALL |
| 486DX-40 8-ISA 3VLB, OCA CACHE, 8-33P | CALL |
| 486DX2-66 6-ISA 3VLB, DCA CACHE, 8-30P | CALL |
| **PENTIUM PCI BOARDS** | |
| MICRONICS M5PL Pentium 80MHZ 5-ISA, 3-PCI, 256K 4-72P, IDE, I/O | CALL |
| AIR 60MHZ, 4-EISA 2-PCI, SCSI, IDE, IO | CALL |
| **PENTIUM VESA BOARDS** | |
| TYAN 60MHZ, 8ISA 3-VESA 256K UP TD 2MG | CALL |
| DCEAN 660MHZ 8-ISA, 2-VESA 256K HEADLAND | CALL |
| AIR 880MHZ 7-ISA 3-VESA, 256K, IDE/ID | CALL |
| **GREEN PC BOARDS** | |
| DCEAN DX2 6-ISA, 3-VESA DCA CACHE | CALL |
| FORTRESS 486DX2-66, 7-ISA, 3-VESA, 256K | CALL |
| OCEAN DX2-66 6-ISA 3-VESA 256K IDE I/D | CALL |
| **IBM - 66MHZ AT 33MHZ PRICES** | |
| ISA 486SLC-66 7-ISA 16K, 8-30 PIN SIMMS | CALL |
| VESA 486SLC-66 7-ISA, 3-VESA, 16K 8-30P | CALL |
| **AMERICAN DIGICOM** | |
| 486SX-25 ISA 128K | CALL |
| 486DX2-66 ISA 128K | CALL |
| 486DX-33 VESA 256K | CALL |
| 486DX2-66 VESA 256K | CALL |
| **NICE Made in U.S.A.** | |
| MINI 486DX-33 5-ISA 3-ELSA 2VBL, 256K 8-30P, ZLF | CALL |
| MINI 486DX-50 5-ISA 3-EISA 2-VELB 256K 8-30PZLF | CALL |
| MINI 486DX2-66 5-ISA 3-EISA, 2-VLB, 1 MEG, 8-30P ZIF | CALL |
| EISA/2 486DX-50 8-EISA 2-ISA 512K, 18-30P, ZIF | CALL |
| SUPER 486DX2-33 8-EISA 1-VLB 256K, 18-30P ZIF | CALL |
| SUPER 486DX2-50 8-EISA 1-VLB 512K, 16-30P ZIF | CALL |
| SUPER 486DX2-66 8-EISA 1-VLB 1MEG, 16-30P ZIF | CALL |
| **A.I.R. Made in U.S.A.** | |
| 486SX-25 8-ISA, 3-VESA 256K 8-30P, ZIF | CALL |
| 486DX2-33 8-ISA, 3-VL 256K 8-30P ZIF | CALL |
| 486DX2-66 8-ISA, 3-VESA 256K 8-30P, ZIF | CALL |
| 486DX2-66 7-ISA, 2-VESA 256K, 8-30P, IDE, SCSI, I/O | CALL |
| 486DX2-50 8-ISA, 3-VESA 256K 4-72P, ZIF | CALL |
| 486DX2-66 8-ISA, 3-VESA 256K 4-72P, ZIF | CALL |
| **VEGA Made in U.S.A.** | |
| 486DX-33 8-ISA, 3-VESA 256K, 8-30P, ZIF | CALL |
| 486DX-33 8-ISA, 3-VESA, 256K 8-30P ZIF | CALL |
| 486DX-660 8-ISA, 3-VESA, 256K, 8-30P, ZIF | CALL |
| 486DX2-66 4-PCI 5-ISA 3-VESA, 256K, ZIF | CALL |
| 486DX2-66 8-ISA, 3VESA, 256K, ZIF | CALL |
| **MICRONICS (U.S.A.)** | |
| MX-30 486DX-33 8-ISA, 2VESA 256K, 4-72P | CALL |
| JX-30 486DX2-33 8-ISA, 2VESA IDE , 4-72P | CALL |
| JX-30 486DX2-66 8-ISA, 2VESA IDE , 4-72P | CALL |
| EISA-3, 486DX-33 8-32, 256K, 4-72P | CALL |
| EISA-3, 486DX-66 8-32, 256K, 4-72P | CALL |
| M4P-3 486DX2-66 6-ISA, 3-PCI, 256K,4-72P, GREEN | CALL |
| M5PI PENTIUM, 60MHZ 5-ISA, 3-PCI, 256K, 4-72P, IDE, I/D | CALL |
| **MYLEX (U.S.A.)** | |
| 486DX2-66 256K MULTI I/O | CALL |
| 486DX-50 EISA 256K MULTI I/O | CALL |
| 486DX2-66 VESA 64K MULTI I/O | CALL |
| 486DX2-66 EISA/VESA 256K MULTI I/O | CALL |
| **AMI Made in U.S.A.** | |
| S-VDY 486DX-33, 7-ISA, 2VESA 256K, 8-30P, IDE | CALL |
| S-VDY 486DX2-66 7-ISA, 2VESA 256K 4-72P, IDE | CALL |
| ENT-IV 486DX-33 8-EISA,2-VESA 256K, 18-30P | CALL |
| ENT-IV 486DX2-66 8-EISA, 2 VESA, 256K, 16-30P | CALL |
| S-VOY 486DX2-66, 5-ISA, 2PCI 256K 8-30P, SCSI, IDE | CALL |
| EISA-3 486DX2-66, 8-32, 256K 4-72P | CALL |

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| CAPACITY M/N | SPEED SIZE | PRICE |
|---|---|---|
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| 127MB ELS127A | 17MS 3 5X1" | $181 |
| 170MB ELS170A | 17MS 3 5X1" | 193 |
| 270MB ELS270A | 16MS 3 5X1" | 259 |
| 540MB LPS540A | 10MS 3 5X1" | 485 |
| **SCSI** | | |
| 270MB LPS270S | 16MS 3 5X1" | 270 |
| 540MB LPS540S SCSI-2 | 10MS 3 5X1" | 495 |
| 1GB P1080S SCSI-2 | 10MS 3.5X1" | 879 |
| 1.2GB P1225S SCSI-2 | 10MS 3 5" | 879 |
| 1.8GB P1800S SCSI-2 | 10MS 3 5" | 979 |

## FUJITSU

FACTORY NEW – 5 YEAR WARRANTY

| | | |
|---|---|---|
| **SCSI** | | |
| 1 2GB M2694SA | 10MS 3 5" | $819 |
| 2 4GB M2654SA | 12MS FH | 1495 |

## MICROPOLIS

FACTORY NEW – 5 YEAR WARRANTY

| | | |
|---|---|---|
| **IDE** | | |
| 976MB 2210A | 10MS 3 5" | $808 |
| 1.6GB 2217A | 10MS 3 5" | 1099 |
| **SCSI-2** | | |
| 976MB MC2210 SCSI-2 | 10MS 3 5" | 808 |
| 1.2GB MC1598 SCSI-2 | 15MS FH | 811 |
| 1.6GB MC1908 SCSI-2 | 10MS FH | 1099 |
| 1 75GB MC2217 SCSI-2 | 10MS 3 5" | 1099 |
| 2 0GB MC1548 SCSI-2 | 14MS FH | 1173 |
| 2 1GB MC1926 SCSI-2 | 11MS 3 5" | 1350 |
| 3 6GB MC1936 SCSI-2 | 11MS FH | 1990 |

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|---|---|---|---|
| **SCSI-II** | | | |
| 1 0GB 3107S | 9 5MS | 3 5" | $865 |
| 1 6GB 3160S | 9 5MS | 3 5" | 1125 |
| 2 0GB 5200S | 12 5MS | FH | 1145 |
| 3 5GB 5350S | 11 5MS | FH | 2225 |

## HEWLETT PACKARD

FACTORY NEW – 5 YEAR WARRANTY

| CAPACITY M/N | SPEED | SIZE | PRICE |
|---|---|---|---|
| **SCSI** | | | |
| 1 0GB C2247 | 10MS | 3 5" | $1145 |
| 1 0GB C97558 | 13MS | FH | 1395 |
| 1 8GB C3009 | 11 5MS | FH | 1995 |
| 2 0GB C3010 | 11 5MS | FH | 2295 |
| 2 1GB C2490 | 8 9MS | 3 5" | 2295 |

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|---|---|
| 1MB X 1-100NS | $6.80 |
| 1MB X 1-80NS | 8.25 |
| 1MB X 1-70NS | 8.50 |
| 1MB X 1-60NS | 8.75 |
| 256K X 1-150NS | 3 80 |
| 256K X 1-120NS | 3.25 |
| 256K X 1-180NS | 3 50 |
| 256 X 1-80NS | 3.75 |
| 256K X 1-70NS | 3.75 |
| 256K X 1-80 NS | 3.75 |
| 256K X 4-180NS | 8 00 |
| 256K X 4-80NS | 8.25 |
| 256K X 4-70NS | 8 50 |
| 256K X 4-80NS | 8.75 |

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|---|---|
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| 32 X 8-15 | 18.00 |
| 8 X 8-25 | 4.80 |
| 32 X 8-25 | 7.80 |
| 64 X 4-26 | 8.80 |
| 16 X 4-25 | 8.00 |
| 8 X 8-20 | 4.50 |
| 32 X 8-20 | 8.80 |
| 64 X 4-20 | 10.80 |
| 16 X 4-20 | 5.50 |
| 16 X 4-15 | 8.80 |
| 64 X 1-20 | 18.00 |
| 64 X 1-15 | 20.80 |

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|---|---|
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| 8087 2 8MHZ INTEL | 139 00 |
| 8087 1 10MHZ INTEL | 00 00 |
| 80287 6 6MHZ INTEL | 00 00 |
| 80287-8 8MHZ INTEL | 00.00 |
| 80287 10 10MHZ INTEL | 00.00 |
| 80287XL 10MHZ INTEL | 75 00 |
| 80287XLT 12MHZ INTEL | 75.00 |
| 80387SX 16 16MHZ INTEL | 75.00 |
| 80387SX-20 20HZ INTEL | 75.00 |
| 80387SX-25 25HZ INTEL | 75.00 |
| 80387DX 16 16MHZ INTEL | 75 00 |
| 80387DX-20 20MHZ INTEL | 75.00 |
| 80387DX-25 25MHZ INTEL | 75.00 |
| 80387DX 33 33MHZ INTEL | 75.00 |
| 80487SX 25 INTEL | 375 00 |
| OVERDRIVE SX/DX33 | 400 00 |
| OVERDRIVE SX/DX25 | 306 00 |
| OVERDRIVE SX DX20 | 200 00 |
| RAPID CAD | 100 00 |
| **CYRIX** | |
| 83D87DX 16 16MHZ CYRIX | 75 00 |
| 83D87DX 20 20MHZ CYRIX | 75.00 |
| 83D87DX-25 25MHZ CYRIX | 75 00 |
| 3D87DX-33 33MHZ CYRIX | 75.00 |
| 83D87DX-40 40MHZ CYRIX | 85.00 |
| 83S87SX16 16MHZ CYRIX | 00 00 |
| 83S87SX20 20MHZ CYRIX | 00 00 |
| 83S87SX25 25MHZ CYRIX | 00.00 |
| 82S87XL CYRIX | 00 00 |
| **WEITEK** | |
| 3167 33MHZ WEITEK | 200 00 |
| 4167 25MHZ WEITEK | 306 00 |
| 4167-33MHZ WEITEK | 406 00 |
| **IIT** | |
| 2C87-8 8MHZ IIT | 54 00 |
| 2C87 10 10MHZ IIT | 54 00 |
| 2C87 12 12MHZ IIT | 00 00 |
| 2C87 20 20MHZ IIT | 84 00 |
| 3C87 16 16MHZ IIT | 00 00 |
| 3C87 20 20MHZ IIT | 80.00 |
| 3C87 25 25MHZ IIT | 80.00 |
| 3C87 33 33MHZ IIT | 00 00 |
| 3C87-40 40MHZ IIT | 75 00 |
| 3S87SX 16 16MHZ IIT | 00 00 |
| 3S87SX 20 20MHZ IIT | 80.00 |
| 3S87SX 25 25MHZ IIT | 80.00 |
| 3S87SX-33 33MHZ ITT | 80.00 |

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| | |
|---|---|
| **386 DX** | |
| 80386 DX/25 | 65.00 |
| 80386 DX/33 | 75.00 |
| AMD DZ40 | 80 00 |
| **486DX/SX** | |
| 80486 DX/25 | 250 00 |
| 80486 DX33 | 299 00 |
| 80486 DX50 | 399 00 |
| 80486 DX 2/50 | 425.00 |
| 80486 DX 2/66 | 499 00 |
| 80486 SX/25 | 125 00 |
| 80486 SX/33 | 145 00 |

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| 200MB 15MS SCSI | 613 00 |
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| | |
|---|---|
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FastSCSI ISA/FL $129/$139
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**OTHER**
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3V EnergyStar Compliant $499
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**NOKIA** PC Multigraph 449E
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Supra ComCard S/R 14 4 . $289

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T4700 CT Active Matrix Color-Dockable 486/DX2, 50MHz, 8MB, 320MB Hard Drive ..... $4,989
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Epson 700 Mono 120MB / 210MB ..... $1879 / $1959
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See opposite page for Epson Flash Card Special!

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50EC: 50MHz, 209MB / 340MB ..... $4,499 / $4,919
75EC: 486 DX4 75MHz, 340 MB, Active Matrix Color ..... $5,249

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TravelMate 4000, 486 DX2/50, 200MB Dual Scan ..... $2,789
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| Chinon 535 Ext. | $385 | $451 | $487 | $526 | $546 | $596 | $626 | add $79 |
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Logitech SoundMan 16 ..... $105
Logitech SoundMan Wave 18 ..... $162
MS Sound System 2.0 w/ board ..... $179
Diamond Sonic Sound ..... $215
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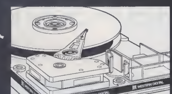

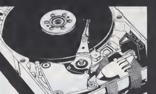

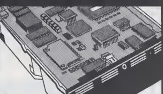

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| 420MB Drive, Local Bus Cache card | $419 | 1Gig Drive, Local Bus Cache Card | $1079 |
| 420MB Drive, GSI-21, 250MB Tape, 2 tapes | $495 | 1Gig Drive, 2Gig DAT, 1 tape | $1599 |
| 540MB Drive, GSI-21 accelerator card | $449 | 1Gig Drive, 32Bit Local Bus | $929 |
| 540MB Drive, GSI-21, 250MB Tape, 2 tapes | $609 | 1.7Gig Drive, 16Bit ISA | $1099 |
| 540MB Drive, Local Bus Cache card | $529 | 1.7Gig Drive, Local Bus Cache Card | $1309 |
| 1Gig Drive, GSI-21 accelerator card | $799 | 1.7Gig Drive, 2Gig DAT, 1 tape | $1839 |
| 1Gig Drive, GSI-21, 250MB Tape, 4 tapes | $939 | 1.7Gig Drive, 32Bit Local Bus | $1169 |
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|---|---|---|---|
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| with GSI-18 & 1 disk | $329 / $519 | with Adaptec 1522 & 1 disk | $399 / $629 |
| Portable external, attaches to | | with Adaptec 1542 & 1 Disk | $529 / $759 |
| printer port with 1 cartridge | $399 / $619 | External for MacIntosh & 1 Disk | $399 / $629 |

## gsi

GSI drive accelerators increase the data transfer rate of your IDE drive 30 to 80%. Works by enabling the drives Read Multiple & Write Multiple commands to greatly increase performance. We highly recommend these products for WD, Conner, Quantum, Seagate, Micropolis, Maxtor, & Fujitsu.

| | Alone | w/Drive |
|---|---|---|
| GSI-21 Board supports 2 IDE, 4 floppy drives. Doubles QIC-80 tape drive speed | $65 | $55 |
| GSI-18 Board supports 2 IDE drives. Works in conjunction with MFM, RLL, etc. | $55 | $45 |
| GSI-32 Board same as -21 adds 2 16550 serial ports & 1 bi-directional parallel port | $139 | $119 |
| GSI MaxIDEA Software solution works on existing IDE configuration (requires less than 1K of memory). Includes performance benchmark test. | $34 | $25 |

## HARD DRIVES

### CONNER

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|---|---|---|---|
| IDE | | | |
| 210MB | 14ms | CFS210A | $202 |
| 340MB | 13ms | CFA340A | $272 |
| 420MB | 14ms | CFS420A | $290 |
| 541MB | 12ms | CFA540A | $399 |
| SCSI | | | |
| 1060MB | 9ms | CFP1060S | $789 |

### Maxtor

| | | | |
|---|---|---|---|
| IDE | | | |
| 245MB | 15ms | 7245A | $249 |
| 345MB | 14ms | 7345A | $278 |
| 540MB | 12ms | 7546A | $392 |
| SCSI | | | |
| 340MB | 14ms | 7345S | $349 |

### MICROPOLIS

| | | | |
|---|---|---|---|
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| 1740MB | 10ms | MC2217A | $1099 |
| SCSI | | | |
| 1052MB | 8.5ms | MC4110 | $819 |
| 1740MB | 10ms | MC2217 | $1122 |
| 3020MB | 11ms | MC1936 | $2099 |
| SCSI-AV Audio / Visual tuned drives | | | |
| 1000MB | 10ms | MC2210AV | $925 |
| 1700MB | 10ms | MC2217AV | $1229 |

### Seagate

| | | | |
|---|---|---|---|
| IDE | | | |
| 213MB | 16ms | ST3243A | $204 |
| 260MB | 16ms | ST3290A | $222 |
| 341MB | 13ms | ST3391A | $280 |
| 452MB | 12ms | ST3550A | $323 |
| SCSI (WIDE SCSI also available) | | | |
| 1690MB | 8ms | ST11950N | $1469 |
| 2145MB | 8ms | ST12550N | $1639 |
| 2148MB | 9ms | ST12400N | $1399 |

### WESTERN DIGITAL

| | | | |
|---|---|---|---|
| IDE | | | |
| 256MB | 12ms | AC2250 | $239 |
| 341MB | 12ms | AC2340 | $269 |
| 425MB | 12ms | AC2420 | $295 |
| 540MB | 11ms | AC2540 | $395 |
| 730MB | 10ms | AC2700 | $629 |
| 1083MB | 10ms | AC31000 | $799 |

## HARD DRIVES

### Quantum

| | | | |
|---|---|---|---|
| IDE | | | |
| 170MB | 14ms | LPS170A | $199 |
| 270MB | 12ms | LPS270A | $229 |
| 342MB | 12ms | LPS340A | $269 |
| 541MB | 12ms | LPS540A | $425 |
| SCSI | | | |
| 170MB | 14ms | LPS170S | $199 |
| 270MB | 12ms | LPS270S | $229 |
| 342MB | 12ms | LPS340S | $289 |
| 541MB | 12ms | LPS540S | $449 |
| 1080MB | 10ms | IMP1080 | $769 |
| 1800MB | 10ms | PD1800S | $969 |
| 2160MB | 9.5ms | IMP2160S | Call |

### digital

| | | | |
|---|---|---|---|
| 2103MB | 9ms | DSP3210 | $1559 |
| 4000MB | 11ms | DSP5400 | $2679 |

## IBM PS/1 PS/2 DRIVES

Complete solutions for your IBM. Larger sizes in stock!

| sizes in stock! | 170MB | 270MB | 340MB |
|---|---|---|---|
| PS/1 386 & 486 | $239 | $299 | $349 |
| PS/2 | | | |
| 25, 30, 30-286 | $299 | $359 | $419 |
| 35 & 40 | $229 | $289 | $339 |
| 50 thru 95 SCSI | $429 | $469 | $549 |
| PS/2 | 210MB | 420MB | 540MB |
| 50 thru 95 IDE | $429 | $599 | $729 |

## CONTROLLER CARDS

| | Alone | w/Drive |
|---|---|---|
| ADAPTEC | | |
| A1522BASIC 16Bit SCSI | $129 | $109 |
| A1542CBASIC 16Bit SCSI | $225 | $215 |
| A2742 EISA SCSI | $389 | $369 |
| A2842 VESA SCSI | $319 | $299 |
| FUTURE DOMAIN | | |
| 1680SVP 16Bit SCSI | $155 | $139 |
| NexStor PCI SCSI | $169 | $149 |
| ALPHA RESEARCH CACHING CARDS | | |
| S425I 16Bit IDE | $99 | $89 |
| S475I 32Bit Local Bus IDE | $139 | $129 |
| S485I 32Bit PCI IDE | $229 | $219 |
| S425S 16Bit SCSI | $229 | $219 |
| S475S 32Bit Local Bus SCSI | $369 | $359 |

Many other types of controllers in stock.

## CD ROM DRIVES

| | | | | |
|---|---|---|---|---|
| NEC | CDR900 | 4X | 180ms | $979 |
| NEC | CDR510 | 3X | 195ms | $389 |
| Toshiba | XM3401 | 2X | 200ms | $319 |
| Toshiba | XM4101 | 2X | 320ms | $219 |
| Sony | CDU561 | 2X | 295ms | $289 |
| Teac | CD50 | 2X | 265ms | $259 |

Pioneer External CD Changers (300ms)

| | | | |
|---|---|---|---|
| DRM602X | 6 disc | 307KB/sec | $869 |
| DRM604X | 6 disc | 612KB/sec | $1149 |
| DRM1804X | 18 disc | 612KB/sec | $2059 |

## MULTIMEDIA KITS

SCSI Drive, sound card (in retail pkg)
MV=Media Vision Pro Audio 16, MS=Media Vision Pro Studio 16
SB= Sound Blaster 16 SCSI. SA= Sound Blaster SCSI ASP.

| | MV | MS | SB | SA |
|---|---|---|---|---|
| XM4101 | $359 | $389 | $419 | $459 |
| CD50 | $399 | $429 | $449 | $489 |
| CDU561 | $429 | $459 | $469 | $519 |
| XM3401 | $459 | $489 | $519 | $559 |
| CDR510 | $509 | $539 | $579 | $609 |
| CDR900 | $1119 | $1149 | $1159 | $1199 |

## CD ROM TOWERS

CD ROM Drive Towers - Multiple CD ROM drives in a single external enclosure. Great for networks, BBS, or business.

| | 2 Drive | 4 Drive | 7 Drive |
|---|---|---|---|
| XM4101 | $579 | $1259 | $2249 |
| CD50 | $649 | $1389 | $2479 |
| CDU561 | $699 | $1479 | $2639 |
| XM3401 | $789 | $1659 | $2999 |
| CDR510 | $939 | $1999 | $3499 |
| CDR900 | $2119 | $4339 | $7489 |

**BUNDLE SPECIALS WITH ANY CD DRIVE PURCHASE!**
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Illustrated Encyclopedia, World Atlas, Mavis Beacon Teaches Typing, San Diego Zoo's Animals, US Atlas, Chessmaster 3000)
Caddies $5 Macintosh CD Driver $29
Altec Lansing ACS-100 Speakers $109

## HARD DISK CARDS

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170MB $269 / $289 240MB $329 / $349
340MB $379 / $409 540MB $619 / $649

## TAPE DRIVES

**IOMEGA** 250MB QIC-80 tape drives include 3yr warranty, software, 1 tape

| | Alone | w/drive |
|---|---|---|
| Internal fits 3.5 or 5.25 bay | $159 | $149 |
| External for printer port | $319 | $309 |

**3 Pack of IOMEGA formatted DC2120 tapes $40 with any purchase!**

### SCSI Tape Drives

| Kit is 16Bit card & 1 tape | | | Bare | Kit |
|---|---|---|---|---|
| 750-1.5Gig | Exabyte | 2501 | $549 | $739 |
| 2Gig | Conner | 4320 | $799 | $969 |
| 2Gig | HP | 35470 | $929 | $1049 |
| 4-8Gig | Conner | 4324 | $1119 | $1329 |
| 4-8Gig | HP | 35480 | $1059 | $1279 |
| 4-16Gig | Sony | SDT5000 | $1099 | $1299 |
| 4-16Gig | HP | C1533A | $1499 | $1699 |

## OPTICAL DRIVES

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High quality, High Performance optical drive solutions include controller, COREL SCSI and 1 disk.

128MB $769 230MB $999 1300MB $2499
HP & Maxoptix drives & media in stock.
Verbatim Optical Media (Qty 5 price)
128MB / 650MB / 1.3Gig $35 / $77 / $105

## MISCELLANEOUS

| TEAC Floppy Drives | Alone | w/HD |
|---|---|---|
| Floppy 1.4 (1.2 + $9) | $45 | $42 |
| Floppy Combo 1.2 & 1.4 | $115 | $105 |
| Maxtor 105MB PCMCIA drive | | $429 |
| PCMCIA to SCSI adapter | | $319 |
| Desktop Docking Module! Mounts in 5 1/4" drive bay. Allows you to use any PCMCIA in your desktop | | $159 |

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intel inside

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- 101 Key enhanced keyboard
- 5-bay desktop case
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## Elegant and Simple

The Pentium processor marks a breakthrough in chip design and processing efficiency. Featuring revolutionary superscalar technology, separate code caches and an enhanced floating point math coprocessor, the Pentium chip's components perform their specialty functions simultaneously to process data at a blazing 90MHz. It'll even prepare your next set of instructions before you execute! And the data zips in and out of the chip, because the Pentium processor moves information along a built-in 64-bit data path. Intricate architecture, simple efficiency.

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Remember when 486DXs came into the market? It was the biggest news in town. But now, there's the Pentium processor running at 90MHz. And nobody shows it off better than Quantex. Just take a look at our system — the numbers are all there. With the power of the 90MHz Pentium chip, this Quantex PCI Performer recognizes no limit.

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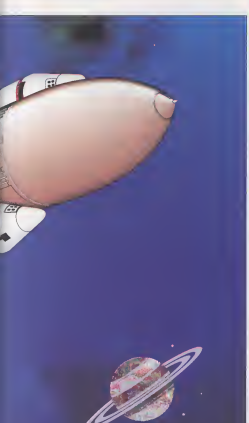

not fully support the processor's wide range of capabilities! But Quantex makes sure you get what you paid for, providing the full processor speeds, internal cache and more. Quantex will even throw in an extra 256KB Secondary Cache Memory to give you an additional performance boost. And, you don't have to leave your favorite software behind. While the Quantex PCI Performer is built for the future, it supports all of today's operating systems, like MS DOS, UNIX, Windows NT, OS/2 and NEXTstep. In addition, it retains compatibility with over 50,000 existing software applications. So, pick and choose as you like. It's compatible!

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Quantex knows that a fast processor needs fast I/O. That's why we've built our PCI Performer with dual PCI.

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The Quantex PCI Performer isn't the only thing that performs to satisfy. Check out the service package that comes with it. Quantex goes to extremes to make sure nothing goes wrong with your system — before and after purchase. We're confident about the quality of our products. That's why we provide a one-year Free Parts and Labor warranty and one-year of Free On-Site service. Quantex also includes a no-questions asked 30-day money back guarantee in addition to lifetime toll-free technical support. Great system. Great service. Great value.

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- 2 serial & 1 parallel port
- 11-bay tower case
- 101 Key enhanced keyboard
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- One year free on-site service
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| Lotus 1-2-3, 4 01 | 279 |
| Lotus 1-2-3, 4 01 Upgrade | 89 |
| Approach 2 1 | 89 |
| Freelance Graphics | 299 |
| Ami Pro 3 01 | 209 |
| Ami Pro 3 01/Quicken/Turbo Tax | 239 |
| Ami Pro 3 01 Upgrade | 59 |
| Organizer 1 1 | 89 |
| CC Mail Group pack | 499 |
| Improv 2 1 | 269 |
| SmartPics | 89 |

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## NETWORKING

**3Com**

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| 16 bit Ethernet Card 3C5Ø7 | $279 |
| Etherlink III 10 Base-T 3C5Ø9 | 129 |
| Etherlink III Coax 3C5Ø9 | 128 |
| Etherlink III Combo 3C5Ø9 | 139 |
| Etherlink III 4/16 10 pack 3C619 | 3,999 |
| Etherlink III 32 bit 10 Base-T 3C579 | 229 |

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| 314-50 AI 5 0 Window Single | 82 |
| 843 NodeRunner 2000/c | 179 |

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| Ethernet+ Elite 16T | $129 |
| Ethernet+ Elite 16T 8 Pack | 679 |

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| TC-4045 16/4 Token Ring | $349 |

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| Intel Ether Express 16 | $99 |
| Intel Ether Express 16TP | 105 |
| Intel Ether Express FlashC | 129 |
| Intel Ether Express EISA Coax | 429 |

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| 1000 User | 27,999 |

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| PPX-03 Parallel Port Multiplexor | 89 |
| PT02-16BT Token Ring 16/4 RJ-11 | 549 |

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| 4MB x 9 70ns | Call |
| 512 x 36 2MB | Call |
| 1 x 36 4MB | Call |
| 2 x 36 8MB | Call |
| 4 x 36 16MB | Call |

## PCMCIA CARDS

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| Boca 14 4 Fax/Modem | $299 |
| Boca Ethernet Adapter RJ45 | 169 |
| Pratical Peripherals 14 4 Fax/Modem | 299 |
| Ministor 42MB Hard Drive | 449 |
| Ministor 85MB Hard Drive | 479 |
| Ministor 105MB Hard Drive | 499 |

**New Media**

| | |
|---|---|
| New Media 16 bit sound card | 299 |
| New Media SCSI adapter card | 249 |

**Megahertz**

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|---|---|
| 2400/9600 bps MBXJ124FM | $199 |
| 14 4/14 4 bps MBXJ1144 | 329 |

**intel**

| | |
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| Intel Fax/Modem 2400/9600 bps | 199 |
| Intel Fax/Modem 9600/9600 bps | 239 |
| Intel Fax/Modem 14 4/14 4 bps | 289 |

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| Xircom Network combo | 299 |
| Xircom Network RJ-45 | 279 |
| Xircom Netwrok BNC | 279 |

**USRobotics**

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| US Robotics Fax/Mdm 14 4/14 4 bps | 339 |
| US Robotics Fax/Mdm 2400/9600 bps | 269 |

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| Surge Arrest | $19 |
| Backup-UPS 250 | 99 |
| Backup-UPS 400 | 189 |
| Backup-UPS 900 | 369 |
| Smart-UPS 400 | 289 |
| Smart-UPS 900 | 559 |
| Smart-UPS 2000* | 1,189 |
| Smart-UPS 9ØØXL | 1,099 |

## PRINTERS

**Canon**

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|---|---|
| BJ-10SX CNBJ1ØSXW | $249 |
| BJ-200E CNBJ2ØØE | 289 |
| BJ-230 CNBJ23Ø | 399 |
| BJC-600 Color CNBJC6ØØ | 589 |
| BJC-800 (Par) CNBJC8ØØ | 1 499 |
| BJC-820 (SCSI) CNBJC82Ø | 1,499 |
| LASER LBP 430 CNLBP43Ø | 589 |
| LBP-860 CNBP86Ø | 1,389 |

**EPSON**

| | |
|---|---|
| Epson AP3250 | $174 |
| Epson LX-810 | 189 |
| Epson FX-870 | 274 |
| Epson LQ-570+ | 239 |
| Epson LQ 1070+ | 359 |
| Epson LQ-870 | 439 |
| Epson LQ-1170 | 589 |
| Epson LQ-2550 Color | 879 |
| Epson DFX-5000 | 1,319 |
| Epson DFX 5000+ | CALL |
| Epson DFX-8000 | 2,199 |
| Epson Stylus 800 | 319 |
| Epson Stylus 800 | 319 |
| Epson Action Printer 3260 | 199 |

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| HP DeskJet 310 MAHPDJ31Ø | $249 |
| HP DeskJet 520 HPDJ52Ø | 365 |
| HP DeskJet 560 HPDJ56Ø | 719 |
| HP DeskJet 1200C MAHPDJ12ØK | 1,419 |
| HP DeskJet 1200C PS MAHPDJ12PK | 1,929 |
| HP LaserJet 4L | 679 |
| HP LaserJet 4P | 985 |

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|---|---|
| 2380 LEX238Ø | $319 |
| 2381 LEX2381 | 449 |
| 2390 LX239Ø | 329 |
| 2391 LEX2391 | 449 |
| 4029Ø30 Laser 10 LEX1ØL | 1,129 |
| ExecJet LEX4Ø76 | 295 |
| Lexmark4039 10R LEX4Ø391 | 1 405 |
| Lexmark 4037 LEX4Ø37 | 679 |
| Lexmark 2380 LEX238Ø | 319 |
| Lexmark 2381+ LEX2381+ | 449 |
| Lexmark 2390+ LEX239Ø+ | 345 |

**NEC**

| | |
|---|---|
| P32ØØ 24 Pin NCMDL32ØØ | $229 |
| P62ØØ 24 Pin NCMDL62ØØ | 424 |
| Silentwriter 1Ø97 NCMDL1Ø97 | 1,429 |

**OKIDATA**

| | |
|---|---|
| OL41ØE Laser | $645 |
| OL4ØØE Laser | 509 |
| OL81Ø Laser | 929 |
| OL85Ø Laser | 1,239 |
| ML38Ø Dot Matrix | 219 |
| ML59Ø Dot Matrix | 419 |
| ML184 Dot Matrix | 229 |
| ML32Ø Dot Matrix | 299 |
| ML321 Dot Matrix | 419 |
| ML 395 Dot Matrix | 966 |
| ML395C Dot Matrix | 1,019 |
| ML 52Ø Dot Matrix | 365 |
| ML521 Dot Matrix | 488 |
| ML591 Dot Matrix | 567 |
| OL 83Ø+ Dot Matrix | 1,079 |

**Panasonic** Office Automation

| | |
|---|---|
| KX-P441Ø Laser | $589 |
| KX-P443Ø Laser | 689 |
| KX-P444Ø Laser | 1 149 |
| KX-P445Ø Laser | 949 |
| KX-P2Ø23 Dot Matrix | 195 |
| KX-P2123 Dot Matrix | 235 |
| KX-P2124 Dot Matrix | 315 |
| KX-P2624 Dot Matrix | 369 |
| KX-P3123 Dot Matrix | 289 |
| KX-P3124 Dot Matrix | 349 |
| KX-P3624 Dot Matrix | 409 |
| SideWriter 4400 | 599 |
| SideWriter 5400 | 899 |

**star**

| | |
|---|---|
| NX-245Ø 24 Pin Color | $249 |
| SJ-144 Color Laser | 459 |
| LS-5EX Laser | 749 |
| SJ48+ Ink Jet | 279 |

**TEXAS INSTRUMENTS**

| | |
|---|---|
| TI MicroWriter LED 5ppm 512K | $489 |
| TI MicroWriter PS23 LED 5ppm 2MB | 679 |
| TI MicroWriter PS65 LED 5ppm 2MB | 929 |
| TI Microlaser Pro 600 PS23 | 1,349 |
| TI Microlaser Pro 600 PS65 | 1,529 |
| TI Color Thunderbird | 399 |

## VIDEO CARDS

**PARADISE**

| | |
|---|---|
| 24 Bit Color Accelerator | |
| VCXLR24BIT | $119 |
| Paradise Accelerator Value Card | |
| VCXLR8VAL | 79 |
| VL33ØØ Local Bus Card | |
| VCXLRVL33 | 139 |

## MODEMS

**intel**

| | |
|---|---|
| Intel Internal 14 4 modem | $139 |
| Intel SatisFAXtion 100 | 99 |
| Intel SatisFAXtion 200 | 225 |
| Intel SatisFAXtion 300 | 245 |
| Intel SatisFAXtion 350 | 269 |
| Intel SatisFAXtion 400 | 289 |
| Intel SatisFAXtion 400e | 329 |

**Hayes**

| | |
|---|---|
| Hayes Ultra 96 Modem | $589 |
| Hayes Ultra 144 Modem | 659 |
| Hayes Optima 24+ Fax 96 | 159 |
| Hayes Optima 96/SC EZ | 349 |
| Hayes Optima 144/SC EZ | 439 |

**PRACTICAL PERIPHERALS**

| | |
|---|---|
| PM14400FXMT Ext V 32bis | 239 |
| PM14400FX PKT Pocket V 42bis | Call |
| PM14400FX Internal V 42bis | 219 |
| PM14400FXSA External LCD | 389 |
| PM14400FX Internal d/f | 219 |
| PM9600FXMT External | 229 |
| PM9600FX Internal | 209 |
| PM2400EFXSA External | 129 |
| PM2400EFX Internal | 99 |

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## CD-ROM DRIVES

**CHINON**

Model CDS535
Bare 359 Kit 419

**NEC**

Model 84
Bare $299 Kit $359
Model 3xl Internal
Bare $499 Kit $559
Model 3xe External
Bare $559 Kit $619

**Talon**

| | |
|---|---|
| Talon DS-100 320ms/300KB | $249 |
| Talon DS-200 245ms/330KB | 299 |

**TEAC**

Bare $339 Kit $399

**PLEXTOR / TEXEL**

Model DM-3028
Internal bare $289 Kit $349
External bare 389 w/controller 449

**TOSHIBA**

Model 3401
Bare $429 Kit $489

## MULTIMEDIA

**CREATIVE**

| | |
|---|---|
| Sound Blaster MIDI Kit | 59 |
| Sound Blaster 16 Multi-CD | 169 |
| Sound Blaster 16 CD ASP | 209 |
| Sound Blaster 16 SCSI | 199 |
| Sound Blaster Deluxe | 69 |
| Sound Blaster 16 SCSI ASP | 219 |
| Sound Blaster 16 Basic | 143 |
| Sound Blaster Pro Deluxe 8 Bit | 89 |
| SBS3ØØ Speaker Set by Yamaha | 99 |
| Video Spigot for Windows | 259 |
| Video Blaster | 349 |
| Wave Blaster Board | 169 |

**MEDIA VISION**

| | |
|---|---|
| Pro 16 MM System II Internal | $529 |
| Pro 16 CD III | 819 |
| Fusion Double CD 16 System | 549 |
| Double Fusion Lx MM Kit Int | 399 |
| Memphis External MM Kit | 599 |
| Pro MIDI Mate Option Kit | 45 |
| Pro Movie Spectrum | 309 |
| Pro Audio Spectrum 16 Board | 129 |
| Pro Audio Spectrum 16 Basic | 109 |
| Pro Audio Studio 16 w/ mic | 169 |

**REVEAL**

**MultimediaFX - 02** Int. drive double speed, 300kb transfer, 16 Bit sound, speakers, microphone and 8 titles $349
**MultimediaFX - 04** Int. drive, double speed, 300kb transfer, 16 Bit sound, speakers, microphone and 16 titles 479
**MultimediaFX - 06** Int. drive, double speed, 300kb transfer 16 Bit sound, speakers, microphone and 21 titles 599

## INPUT DEVICES

| | |
|---|---|
| Digitus Ergonomic Mouse | $45 |
| Logitech Mouse Man serial | |
| Logitech Mouse Man, bus | 79 |
| Logitech TrackMan Portable | 95 |
| Logitech ScanMan 256 | 289 |
| Logitech ScanMan 256 w/ Catchword | 319 |
| Logitech Foto Man | 549 |
| Kurta XLP 12"x12" Digitizer | 239 |

## MATH COPROCESSORS

**intel**

| | |
|---|---|
| 80287XL | $99 |
| 80387SL/SX | 99 |
| 80387 (DX) | 99 |

## INTEL OVERDRIVE

| | |
|---|---|
| OverDrive 486SX20 | $329 |
| OverDrive 486SX25 | 439 |
| OverDrive 486DX25 | 449 |
| OverDrive 486DX33 | 579 |

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**HITACHI**

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|---|---|
| 15" SuperScan CM1586 | $499 |
| 17" SuperScan Elite CM1797 | 1,099 |
| 20" SuperScan 20s CM2Ø95MU | 1,349 |
| 20" SuperScan Pro CM2Ø87 | 1,649 |
| 21" SuperScan ProXL CM2187-515 | 2,099 |
| 21" SuperScan Elite CM2188 | 2,499 |

**Insight**

| | |
|---|---|
| 15" 1024x768, NI, .28 dp MRP II | $399 |
| 17" 1280x1024, NI, .28 dp, MPRII | 699 |
| 20" 1280x1024, NI, .28 dp, | 1,299 |

**NEC**

| | |
|---|---|
| 15" MultiSync 3FGe CMNEC3FGe | $639 |
| 15" MultiSync 4FGe CMNEC4FGe | 749 |
| 17" MultiSync 5FGe CMNEC5FGe | 1,069 |
| 21" MultiSync 6FG CMNEC6FG | 2,359 |

**MAG INNOVISION**

| | |
|---|---|
| 15" MAG DX .28 dp Energy Star, MPRII | $439 |
| 17" MAG DX .26 dp Energy Star, MPRII | 699 |

**NOKIA** CONSUMER ELECTRONICS

| | |
|---|---|
| Nokia 445x 21" CM445M | $2,399 |
| Nokia 445M 21" CM44MTCO | 2,599 |
| Nokia 447M 17" CM447B | 1,199 |
| Nokia 447BTCO 17" CM447BTCO | 1,399 |
| Nokia 449E 15" CM449E | 599 |
| Nokia 44BS 14" CM44BS | 499 |

## REMOVABLE STORAGE

**FUJITSU**

| | |
|---|---|
| Fujitsu Internal Magneto Optical (PC) | $799 |
| Fujitsu DynaMO (Mac) | 899 |
| Bernoulli PC Powered 150 | 469 |
| Bernoulli Insider Multidisk 150 | 489 |
| Bernoulli MacTransportable 150 | 559 |
| Bernoulli PC2B Interface Card | 109 |

## TAPE BACKUPS

**COLORADO MEMORY SYSTEMS**

| | |
|---|---|
| 250MB COJUMBO25Ø | $189 |
| 120MB COJUMBO | 99 |
| Trakker 250MB CØJT20 | 329 |
| Trakker 120MB CØJT1Ø | 299 |

**CONNER**

| | |
|---|---|
| TapeStor 250MB Internal | $139 |
| TapeStor 250MB Ext Par | 359 |

**EXABYTE**

| | |
|---|---|
| 8mm 5 0 Gig Model 85Ø5 | $2,599 |
| 8mm 2.2 Gig Model 82Ø5 | 1,699 |
| 8mm Tape Cartridge | 16 95 |

**IOMEGA**

| | |
|---|---|
| Iomega Tape250 Insider Internal | $189 |
| Iomega Tape250 Insider Half-height | 189 |
| Iomega Tape250 PC Powered Ext | 319 |
| Iomega Tape250 Insider Basic | 169 |

**Talon** 250MB Internal

| | |
|---|---|
| w/2 unformatted tapes TBTA25ØIK | $179 |
| w/5 formatted tapes TBTA25ØIK5 | 229 |

**WangDAT**

| | |
|---|---|
| 4mm DAT 2GB Int 16 Bit Kit | $999 |
| 4mm DAT 4GB 3200 Int 16 Bit Kit | 1,199 |
| 4mm DAT 4GB 3200 Ext 16 Bit Kit | 1 299 |
| 4mm DAT 8GB 3400 Int 16 Bit Kit | 2,399 |

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Complete installation kit, including: 5 1/4" mounting frame, Data Cable Rail Set, Screws Jumper Blocks & Bezels HDI's Hard Drive Installation Guide with step-by-step installation instructions

**WESTERN DIGITAL**

| Capacity | Interface | Model | Access | FF/Height | Bare | Kit |
|---|---|---|---|---|---|---|
| 170MB | IDE | WDAL217Ø | 12ms | 2 5" | $319 | $339 |
| 200MB | IDE | WDAL22ØØ | 12ms | 2.5" | 339 | 359 |
| 210MB | IDE | WD121ØA | 12ms | 3.5" 1"H | 209 | 229 |
| 250MB | IDE | WD225ØA | 12ms | 3.5" 1"H | 219 | 239 |
| 270MB | IDE | WD127ØA | 12ms | 3.5" 1"H | 229 | 249 |
| 340MB | IDE | WD234ØA | 12ms | 3 5" 1"H | 269 | 289 |
| 420MB | IDE | WD242ØA | 12ms | 3.5" 1"H | 289 | 309 |
| 540MB | IDE | WD254ØA | 12ms | 3.5" 1"H | 389 | 409 |

**CONNER**

| Capacity | Interface | Model | Access | FF/Height | Bare | Kit |
|---|---|---|---|---|---|---|
| 213MB | IDE | CFS21ØA | 14ms | 3.5" 1"H | $219 | $239 |
| 340MB | IDE | CFA34ØA | 13ms | 3 5" 1"H | 349 | 499 |
| 340MB | SCSI | CFA34ØS | 13ms | 3 5" 1"H | 309 | 329 |
| 426MB | IDE | CFS42ØA | 14ms | 3 5" 1"H | 359 | 379 |
| 540MB | SCSI | CFA54ØS | 10ms | 3 5" 1"H | 679 | 829 |
| 1060MB | SCSI | CFP1Ø6ØS | 9.5ms | 3.5" 1"H | 899 | 1,049 |

**FUJITSU**

| Capacity | Interface | Model | Access | FF/Height | Bare | Kit |
|---|---|---|---|---|---|---|
| 510MB | IDE | FJ2624A | 12ms | 3 5" HH | $499 | $519 |
| 520MB | SCSI | FJ2624S | 12ms | 3.5" HH | 489 | 639 |
| 1080MB | SCSI | FJ2694S | 10ms | 3 5" HH | 799 | 949 |

**Maxtor**

| Capacity | Interface | Model | Access | FF/Height | Bare | Kit |
|---|---|---|---|---|---|---|
| 130MB | IDE | MX7131A | 15ms | 3.5" 1"H | $189 | $209 |
| 245MB | IDE | MX7245A | 15ms | 3.5" 1"H | 239 | 259 |
| 245MB | SCSI | MX7245S | 15ms | 3.5" 1"H | 249 | 399 |
| 340MB | IDE | MX7345A | 12ms | 3.6" HH | 289 | 309 |
| 340MB | SCSI | MX7345S | 12ms | 3 5" HH | 349 | 499 |

**MICROPOLIS**

| Capacity | Interface | Model | Access | FF/Height | Bare | Kit |
|---|---|---|---|---|---|---|
| 976MB | IDE | MC221ØA | 10ms | 3.5" HH | $779 | 799 |
| 1050MB | SCSI | MC211ØAV | 10ms | 3.5" HH | 899 | 1,049 |
| 1050MB | SCSI | MC411ØS | 8.5ms | 3.5" HH | 799 | 949 |
| 1626MB | IDE | MC2217A | 10ms | 3.5" HH | 1,089 | 1,109 |
| 1690MB | SCSI | MC2217AV | 10ms | 3.5" HH | 1,199 | 1,349 |
| 1750MB | SCSI | MC2217S | 10ms | 3.5" HH | 1,079 | 1,229 |
| 2100MB | SCSI | MC1928 | 11ms | 5.25" FH | 1,399 | 1,549 |
| 3000MB | SCSI | MC1936 | 11ms | 5 25" FH | 2,069 | 2,219 |
| 3000MB | SCSI | MC1936AV | 10ms | 5 25" FH | 2,149 | 2,299 |

**Quantum**

| Capacity | Interface | Model | Access | FF/Height | Bare | Kit |
|---|---|---|---|---|---|---|
| 170MB | IDE | QULPS17ØA | 15ms | 3 5" 1"H | $189 | $209 |
| 170MB | SCSI | QULPS17ØS | 14ms | 3 5" 1"H | 189 | 339 |
| 270MB | SCSI | QULPS27ØS | 12ms | 3.5" 1"H | 269 | 419 |
| 270MB | IDE | QULPS27ØA | 12ms | 3 5" 1"H | 239 | 259 |
| 340MB | SCSI | QULPS34ØS | 12ms | 3.5" 1"H | 279 | 299 |
| 340MB | IDE | QULPS34ØA | 12ms | 3.5" 1"H | 279 | 299 |
| 540MB | IDE | QULPS54ØA | 12ms | 3 5" 1"H | 479 | 499 |
| 540MB | SCSI | QULPS54ØS | 12ms | 3.5" 1"H | 479 | 629 |
| 1080MB | SCSI | QUEM1Ø8ØS | 9ms | 3.5" 1"H | 779 | 929 |
| 1225MB | SCSI | QUPD1225S | 10ms | 3 5" HH | 949 | 1,099 |
| 1800MB | SCSI | QUPD18ØØS | 10ms | 3.5" HH | 999 | 1,149 |

**Seagate**

| Capacity | Interface | Model | Access | FF/Height | Bare | Kit |
|---|---|---|---|---|---|---|
| 130MB | IDE | ST3145A | 15ms | 3 5" 1"H | 189 | $209 |
| 210MB | IDE | ST3243A | 14ms | 3 5" 1"H | 209 | 229 |
| 260MB | IDE | ST329ØA | 16ms | 3 5" 1"H | 219 | 239 |
| 340MB | IDE | ST3391A | 11ms | 3.5" FH | 269 | 289 |
| 340MB | SCSI | ST339ØN | 12ms | 3 5" 1"H | 379 | 529 |
| 420MB | IDE | ST3491A | 14ms | 3 5" 1"H | 289 | 309 |
| 452MB | IDE | ST355ØA | 12ms | 3 5" 1"H | 339 | 359 |
| 452MB | SCSI | ST355ØN | 12ms | 3.5" 1"H | 529 | 679 |
| 540MB | SCSI | ST3655N | 12ms | 3 5" 1"H | 589 | 739 |
| 545MB | IDE | ST3655A | 12ms | 3.5" 1"H | 389 | 409 |
| 1052MB | SCSI | ST312ØØN | 11ms | 3 5" 1"HH | 769 | 919 |
| 1700MB | SCSI | ST119ØØN | 9ms | 3 5" 1"HH | 1,099 | 1249 |
| 1700MB | SCSI | ST1195ØN | 8ms | 3.5" 1"HH | 1,499 | 1,649 |
| 2100MB | SCSI | ST124ØØN | 9ms | 3 5" 1"HH | 1,449 | 1,599 |
| 2145MB | SCSI | ST1255ØN | 8ms | 3.5" 1"HH | 1,699 | 1,849 |
| 2900MB | SCSI | ST434ØØN | 11ms | 5.25" FH | 2,049 | 2,199 |

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## Z-STAR 433VL

▲ 486SLC/33 Processor

| Screen | Hard Drive | Price |
|---|---|---|
| Mono | 200MB | $1659* |
| Dual Scan | 200MB | $2299 |

Lease for $59/mo.

## Z-NOTE+

| Processor | Screen | Hard Drive | Price |
|---|---|---|---|
| 486SL/33 | Mono | 200MB | $2549 |
| 486SL/33 | Active | 200MB | $4199 |

Lease for $96/mo.

## Z-LITE 425L Subnotebook

▲ 486SL/25 Processor
▲ PCMCIA modem included

| Hard Drive | Modem | Price |
|---|---|---|
| 120MB | 24/96 | $1519 |
| 120MB | 14.4/14.4 | $1629 |
| 170MB | 24/96 | $1629 |
| 170MB | 14.4/14.4 | $1719 |

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$1659*

Z-STAR

## TexasInstruments

## TravelMate 4000E Monochrome

▲ High-speed video
▲ Docking system ready
▲ 10" display
▲ Full travel keyboard

| Processor | Price |
|---|---|
| 486SX/25 | $1679* |
| 486DX2/50 | $2429 |

Lease for $61/mo.

$1679*

TravelMate 4000E Color

## TravelMate 4000E Color

| Processor | Screen | Price |
|---|---|---|
| 486SX/25 | Enhanced Color | $1849 |
| 486DX2/40 | Enhanced Color | $2429 |
| 486DX2/50 | Dual Scan | $2749 |
| 486DX2/50 | Active Matrix | $3349 |
| 486DX4/75 | 8.4" Active Matrix | $4499 |
| 486DX4/75 | 9.5" Active Matrix | $4999 |

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## AST

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## Bravo NB

| Model | Screen | Hard Drive | Price |
|---|---|---|---|
| 425s/ 123W | Mono | 120MB | $1449* |
| 425s/ 173W | Mono | 170MB | $1539 |
| 433s 203W | Mono | 200MB | $1629 |
| 433s 203W | Mono | 200MB | $2249 |

Lease for $68/mo.

$1449*

Bravo NB

## PowerExec

| Model | Screen | Hard Drive | Price |
|---|---|---|---|
| 433SL 203W | Mono | 200MB | $2259 |
| 433SL 203W | Active | 200MB | $3899 |
| 433SL 343W | Active | 340MB | $4299 |

Lease for $83/mo.

## AST

Authorized Systems Reseller

## Bravo LC Desktops

| Model | RAM | Hard Drive | Price* |
|---|---|---|---|
| 433s 173W | 4MB | 170MB | $1139 |
| 433s 273W | 8MB | 270MB | $1369 |
| 450s 173W | 4MB | 170MB | $1359 |
| 450s 273W | 8MB | 270MB | $1589 |
| 466d 273W | 8MB | 270MB | $1889 |
| 466d 543W | 8MB | 540MB | $2269 |
| 4/100 273W | 8MB | 270MB | $2339 |
| 4/100 543W | 8MB | 540MB | $2719 |

Lease for $50/mo.

$1139*

Bravo LC

## Bravo MT

| Model | Hard Drive | Price* |
|---|---|---|
| 433 Model 3 | Optional | $1239 |
| 433 Model 173W | 170MB | $1519 |
| 433 Model 343W | 340MB | $1979 |
| 466d Model 3 | Optional | $1659 |
| 466d Model 173W | 170MB | $1929 |
| 466d Model 343W | 340MB | $2399 |

*Monitors sold separately

Lease for $50/mo.

# Hewlett Packard Power

## LaserJet 4L

▲ 4PPM
▲ Crisp, 300dpi print-quality
▲ Resolution Enhancement Technology
▲ 1-year warranty

LaserJet 4L $729.99

LaserJet 4L

## LaserJet 4P

▲ 4PPM
▲ Sharp, 600dpi print-quality
▲ 2MB RAM w/Memory Enhancement Technology
▲ 1-year warranty

LaserJet 4P $999.99

## DeskJet/DeskWriter 310

▲ High quality 3 PPM printing
▲ Low cost optional color kit
▲ 1-year warranty

| | |
|---|---|
| DeskJet 310 | $299.99 |
| DeskWriter 310 | $299.99 |

## DeskJet/DeskWriter 520

▲ Sharp, 600 dpi "laser-like" print quality
▲ Resolution Enhancement Technology for smooth, crisp text and graphics
▲ 3-year warranty

| | |
|---|---|
| DeskJet 520 | $299.99 |
| DeskWriter 520 | $299.99 |

## DeskJet 500C

▲ Letter-quality 300dpi color printing
▲ 100 Sheet feeder for versatile paper handling
▲ 3-year warranty

DeskJet 500C $389.99

## DeskJet 310

## DeskJet/DeskWriter 560C

▲ Color 600 dpi "laser-like" print quality
▲ Resolution Enhancement Technology for smooth, crisp text and graphics
▲ 3-year warranty

| | |
|---|---|
| DeskJet 560C | $579.99 |
| DeskWriter 560C | $579.99 |

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| Pre-Installed Software Discount | YES | | |
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| Customer Satisfaction Is Top Priority | YES | | |

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## UltraLite Versa E

- 486 processor
- 4MB RAM, expandable to 20MB
- 2 Type II PCMCIA slots
- MS-DOS 6.2, Windows 3.1, built-in trackball

| Processor | Screen | Hard drive | Price |
|---|---|---|---|
| DX2/40 | Active color | 120MB | $3819 |
| DX2/40 | Active color | 250MB | $4229 |
| DX2/50 | Monochrome | 209MB | $3259* |
| DX2/50 | Active color | 209MB | $4499 |
| DX2/50 | Active color | 340MB | $4919 |
| DX4/75 | Active color | 340MB | $5229 |

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The Versa E notebook series is upgradable to grow with your needs. For ease of upgrade and service, the UltraLite Versa's floppy drive, hard disk drive and memory card slide in and out of their storage slots. If you require extended battery life, slide out the Versa's floppy drive, pop in a second battery, and double your time on the road.

**NEC Versa E DX4/75 -340 Now Available**

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|---|---|
| MultiSpin 3Xp Portable Drive | $429.99 |
| MultiSpin 3XI Internal Drive | $479.99 |
| MultiSpin 3Xe External Drive | $589.99 |

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**3V**

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- 1024x768, .28mm NI
- 72MHz VESA refresh
- MPR II, EnergyStar

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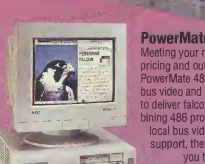

## PowerMate Desktops

Meeting your needs for aggressive pricing and outstanding quality, the PowerMate 486 series features local bus video and a graphics accelertor to deliver falcon-like speed. By combining 486 processing power with local bus video and True Color support, the PowerMate takes you to new heights in performance.

## PowerMate Desktops

- 4MB RAM expandable to 36MB
- 8KB cache expandable to 256KB
- Local bus True Color video
- Graphics accelerator
- 3 expansion slots, 3 drive bays
- MS DOS, Windows 3.1, NEC mouse

| Processor | Hard drive | Price |
|---|---|---|
| 486SX/33 | 170MB | $1123 |
| 486DX2/50 | 210MB | $1399 |
| 486DX2/66 | 210MB | $1749 |

*NEC SVGA monitor $319.99*

**Lease for $55/mo.**

# Compaq Compleat

**Call About New LTE Elite**

## COMPAQ ProLinea Desktops

- 4MB RAM expandable to 32MB
- 3.5" floppy drive
- Local bus graphics
- COMPAQ mouse
- MS DOS 6.0, Windows 3.1

| Processor | RAM | Hard Drive |
|---|---|---|
| 486SX/33 | 4MB | 120MB |
| 486SX/33 | 4MB | 240MB |
| 486DX/33 | 4MB | 240MB |
| 486DX2/66 | 4MB | 340MB |

## COMPAQ ProLinea MT

- 4-8MB RAM expandable to 64MB
- 8KB cache expandable to 128KB
- 3.5" floppy drive
- Local bus graphics
- 5 expansion slots, 5 drive bays
- COMPAQ mouse
- MS DOS 6.0, Windows 3.1, TabWorks

| Processor | RAM | Hard Drive |
|---|---|---|
| 486SX/33 | 4MB | 340MB |
| 486DX2/50 | 4MB | 340MB |
| 486DX2/66 | 8MB | 525MB |

## ProLinea Net1

- 486SX/25 or 486SX/33 processor
- 4MB RAM expandable to 20MB
- 3.5" floppy drive
- 100MB or 200MB hard drive
- Integrated 14", 28mm color monitor
- Integrated ethernet or token ring interface
- COMPAQ mouse
- MS-DOS 6.0, Windows 3.1, TabWorks

## COMPAQ Contura 4/25

- 486SL/25 processor
- 4MB RAM expandable to 20MB
- 209MB hard drive
- 9.5" display, available with monochrome or dual scan color
- MS DOS 6.0, Windows 3.1, trackball
- 3-year warranty

## COMPAQ Concerto

- 4MB RAM expandable to 20MB
- 9.5" mono display
- 2 TYPE II or 1 Type III PCMCIA slots
- Untethered intelligent pen
- Integrated, detachable keyboard
- MS DOS 6.0, Windows 3.1, InkWare NoteTaker,
- PenPower for Excel

| Processor | RAM | Hard Drive |
|---|---|---|
| 486SL/25 | 4MB | 120MB |
| 486SL/25 | 4MB | 250MB |
| 486SL/33 | 4MB | 250MB |

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- ▲ VESA Local Bus graphics
- ▲ 512KB Video RAM exp. to 1MB
- ▲ 2 Serial, parallel, mouse, and keyboard ports
- ▲ IBM DOS 6.1/MS Windows 3.1, mouse, enhanced 101 keyboard

| Processor | Hard Drive | Price* |
|---|---|---|
| 486SX/25 | 120MB | $929 |
| 486DX/33 | 212MB | $1399 |
| 486DX2/66 | 212MB | $1789 |

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## ValuePoint® Desktops

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- ▲ 4MB RAM exp. to 64MB
- ▲ Pentium upgradable
- ▲ VESA Local Bus graphics (w/open VESA slot)
- ▲ 1MB Video RAM exp. to 2MB
- ▲ 5 expansion slots, 5 drive bays
- ▲ IBM DOS 6.1, MS Windows 3.1, mouse

| Processor | Hard Drive | Price* |
|---|---|---|
| 486SX/33 | 170MB | $1359 |
| 486DX/33 | 212MB | $1559 |
| 486DX/33 | 340MB | $1719 |
| 486DX2/66 | 340MB | $2159 |

Minitower & Multimedia models also available

## ValuePoint® MiniTower

*The power to grow*

- ▲ 486DX2/66 processor
- ▲ Pentium upgradable
- ▲ 128KB cache upgradable to 256KB
- ▲ VESA local bus graphics (w/open VESA slot)
- ▲ 1MB video RAM exp. to 2MB
- ▲ 8 expansion slots, 6 drive bays
- ▲ IBM DOS 6.1, MS Windows 3.1, mouse

| RAM | Hard Drive | Price* |
|---|---|---|
| 4MB | 340MB | $2269 |
| 8MB | 527MB | $2699 |

*monitors sold separately

## ThinkPad® 350 notebooks

*Performance in just 5.2lbs*

- ▲ 486SL25 processor
- ▲ 4MB RAM exp. to 20MB
- ▲ Local Bus Graphics
- ▲ 9.2" VGA color or 9.5" VGA mono screen
- ▲ PCMCIA Type II slot
- ▲ TrackPoint II integrated pointing device
- ▲ IBM DOS, Prodigy

| Screen | Hard Drive | Price |
|---|---|---|
| Monochrome | 250MB | $2219 |
| Passive Color | 125MB | $2199 |
| Passive Color | 250MB | $2609 |

## ThinkPad® 500 subnotebooks

*Lighten your load, and increase your power.*

- ▲ IBM 486SLC2/50 processor
- ▲ 4MB RAM exp. to 12MB
- ▲ 170MB hard drive
- ▲ 7.4" VGA monochrome display
- ▲ Type II PCMCIA slot
- ▲ TrackPoint II integrated pointing device
- ▲ 3.5" external floppy drive
- ▲ NiMH battery, AC adapter
- ▲ Weighs only 3.8 lbs.
- ▲ IBM DOS 6.1, Prodigy

**$1939**

# Toshiba Direct

## T4700/T4800

- ▲ 8MB RAM, expandable to 24MB
- ▲ Brilliant 9.5" display with local bus video
- ▲ 2 PCMCIA slots (Type II, Type III)
- ▲ Microsoft Sound System, built-in micrphone, audio out port
- ▲ MS-DOS, UltraFont, Indeo video compression software, Windows 3.1(T4700)/Windows for Workgroups 3.11 (T4800)

| Model | Processor | Screen | Hard Drive | Price |
|---|---|---|---|---|
| T4700 | 486DX2/50 | Dual scan color | 200MB | $3999 |
| T4700 | 486DX2/50 | Dual scan color | 320MB | $4329 |
| T4700 | 486DX2/50 | Active color | 200MB | $4599 |
| T4700 | 486DX2/50 | Active color | 320MB | $4949 |
| T4800 | 486DX4/75 | Active color | 500MB | $5619 |

Lease for $147/mo

T4800

TOSHIBA

T3400CT

## T1910/1950

- ▲ 4MB RAM, expandable to 20MB
- ▲ 9.5" display
- ▲ Type III PCMCIA slot
- ▲ 82-key keyboard
- ▲ MS-DOS, Windows 3.1
- ▲ Ballpoint mouse with Quickport Enhanced power management

| Model | Processor | Screen | Hard Drive | Price |
|---|---|---|---|---|
| T1910 | 486SX/33 | Monochrome | 200MB | $1729 |
| T1910 | 486SX/33 | Dual scan color | 200MB | $2329 |
| T1950 | 486DX2/40 | Monochrome | 200MB | $2099 |
| T1950 | 486DX2/40 | Dual scan color | 200MB | $2719 |
| T1950 | 486DX2/40 | Active color | 200MB | $3029 |
| T1950 | 486DX2/40 | Active color | 320MB | $3399 |

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## Portege T3400

- ▲ Ultra-portability at only 4.1lbs
- ▲ 486SX/33 processor
- ▲ 120MB hard drive
- ▲ 4MB RAM, expandable to 20MB
- ▲ PCMCIA Type II slot
- ▲ External 3.5" disk drive
- ▲ Integrated AccuPoint pointing device

| Screen | Price |
|---|---|
| Monochrome | $2259 |
| Active Color | $3469 |

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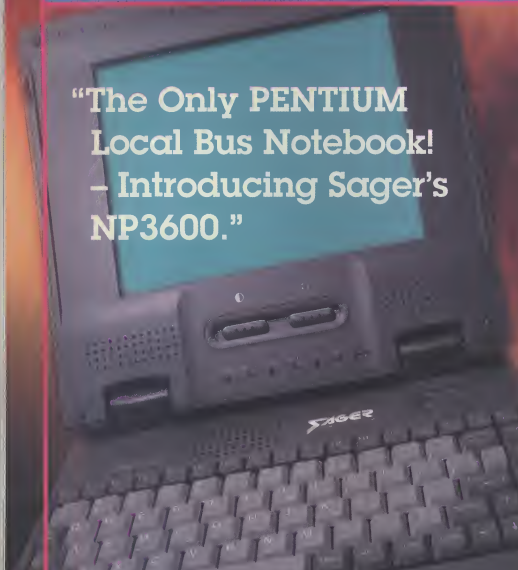


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With more power than most desktops, these Sager notebooks were developed exclusively for performance-driven notebook users. Sager designed and built these systems with one goal – to give you the performance capabilities and features of the most powerful desktop, in a compact, lightweight notebook. These portable powerpacks feature Pentium performance or 486 DX-4 upgradeability, both Local Bus video and Local Bus IDE, PCMCIA, built-in audio and more. The result is powerful performance in a lighter, smaller form than any other notebook.

### PENTIUM NP3600 CONFIGURATIONS

- Intel Pentium™ 60/66MHz CPU
- 1MB Video RAM
- 32-bit VESA Local Bus Video with Windows Accelerator
- 32-bit Local Bus IDE
- Built-In Audio Chip, Microphone, & Speaker
- 8MB RAM Expandable to 40MB
- Removable 250MB Hard Drive (340, 520MB Optional)
- 3.5" 1.44MB Floppy Drive
- 9.5" 640x480 VGA Display, 256 Colors, CRT 1024x768 256 colors
- Simultaneous CRT & LCD Operation
- Extra Large Built-In 25mm Trackball
- 1 Type II & 1 Type III PCMCIA Slots
- 46 Watt NiMH Battery
- 1 16C550 Compatible Serial Port
- 1 Parallel Port with ECP/EPP Support
- Ports for Ext. Keyboard, Ext VGA Monitor & 200 Pin Connector for Docking Station
- Jacks - 1 line in & 1 line out
- 86-Key Keyboard
- Microsoft DOS 6.21
- Carrying Bag & AC/Adapter
- Weight 8.15lbs. (with Battery)
- 11.14"W x 10.31"D x 2.56"H
- Sager's Umbrella Protection Policy

### NP3600 FEATURES

- Intel Pentium™ 64-bit performance
- Super Fast 32-bit VESA Local Bus Video with Windows Accelerator & 1MB Video RAM
- 32-bit Local Bus IDE, improved data transfer rate of up to 45%
- 1 PCMCIA Type III & 1 PCMCIA Type II Slots
- Built-in Audio Chip, Microphone, & Speaker (Now you can record, compress, store and playback voice, sound, and music to disk. Soundblaster and Microsoft Windows Sound System compatible)
- VESA Local Bus Power when used with Optional VL-Bus Docking Station
- 46 Watt Extra Large NiMH Battery
- Extra Large Built-In 25mm Trackball
- Large Palm Rest Area for Easy Typing
- Flash ROM for BIOS Upgrade through software
- 2-Hour Quick Charge

### NP3600 / NP7500 OPTIONS

VL-Bus Docking Station
Numeric keypad
Car Adapter
PCMCIA Cards (Fax/Modem, Ethernet LAN Adapter & more)

# R T A B L E S

## 486 NP7500 CONFIGURATIONS & FEATURES

- Intel SL enhanced CPU upgradeable to 486DX4 (486SX>DX>DX2>DX4)
- 1MB Video RAM
- Super Fast 32-bit VESA Local Bus Video with Windows Accelerator
- Super Fast 32-bit Local Bus IDE with improved data transfer rate of up to 45%
- Built-in Audio Chip, Microphone, & Speaker (Now you can record, compress, store and playback voice, sound, and music to disk
- Extra Large Capacity NiMH Battery – No Memory Effect and 40%-50% Longer Running/Operating Timespan
- Large 19mm Trackball Centered on Large Palm Rest Area for Easy Typing
- 2 PCMCIA Type I & II or 1 Type III IC Card Slot
- Flash ROM for BIOS Upgrade through software
- 4MB RAM expandable to 36MB
- Removeable 250MB Hard Drive (340, 520MB Optional) offers flexibility, upgradeability and security
- 3 5' 1.44MB Floppy Drive
- 9 5' 640x480, VGA Display 256 Colors or 64 Gray Shades CRT, 1024x768 256 Colors
- Simultaneous CRT & LCD Operation
- 180° LCD Display Angle Rotation
- Built-in System Management Mode (SMM)
- Ports for 1S, 1P, Ext. keyboard, Ext VGA monitor, & 200 Pin Connector for Docking Station
- Jacks - 1 line in & 1 line out
- 86-Key Keyboard
- Microsoft DOS 6.21
- Carrying Bag & AC/Adapter
- Weight 6 4lbs (with Battery)
- 11.14'W x 9.48'D x 1.95'H
- 2-Hour Quick Charge
- VESA Local Bus Power when used with Optional VL-Bus Docking Station
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|---|---|---|---|
| NP3600/PENTIUM-60 | | $3395 | $4395 |
| NP3600/PENTIUM-66 | | $3595 | $4595 |
| NP7500/486SX-33 | $1675 | $2175 | $3175 |
| NP7500/486DX-33 | $1825 | $2325 | $3325 |
| NP7500/486DX2-66 | $1995 | $2495 | $3495 |
| NP7500/486DX4-100 | $2245 | $2745 | $3745 |
| NP700/486SX-25 | $1345 | $1825 | |
| NP700/486DX-33 | $1495 | $1975 | |
| NP700/486DX2-66 | $1645 | $2125 | |

## 486 NP700 CONFIGURATIONS

- 1MB Video Ram
- 4MB RAM expandable to 16MB
- Removable 120MB Hard Drive (250, 340, 520MB Optional)
- 3 5' 1 44MB Floppy Drive
- 9 5' 640x480, VGA Display 256 Colors or 64 Gray Shades
- Large Built-In 14mm Trackball (Can be replaced with another module)
- PCMCIA Type I & II Slot
- Ports for 1S, 1P, Ext keyboard/keypad, VGA monitor & AT/Bus for expansion box
- 85-Key Keyboard
- Nickel Metal Hydride battery
- Microsoft DOS 6.21
- Carrying Bag & AC/Adapter
- Weight 5 5lbs with Battery
- 11 4'W x 8 6'D x 1 65'H
- Sager's Umbrella Protection Policy

## NP700 FEATURES

- Module Pack Area: (Optional) Fax/Modem, PS/2 Mouse+COM 2, Audio
- PCMCIA Slot
- Intel 486 Upgradeable CPU (486SX >486SX >486DX2)
- 180° LCD Display Angle Rotation
- 2-Hour Quick Charge
- NiMH Battery: No memory effect, Longer Battery Life
- External Battery Pack (Optional) Doubles Running Hours Screws Into Bottom Back of Notebook Raising & Angling Keyboard for Easy Typing

## NP700 OPTIONS

FAX/Modem Module
PS/2 Mouse + COM 2 Port Module
Audio Module
Internal/External Battery Pack
Numeric Keypad
Car Adapter
Expansion Box
PCMCIA Cards (Fax/Modem, Ethernet LAN Adapter & more)

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NP700
PRICES & INFORMATION

## SAGER'S UMBRELLA PROTECTION POLICY

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- 48-hour Repair Promise
- 72-hour Repair Promise
- 1-Year Parts and Labor Limited Warranty
- Lifetime Toll-Free Technical Support

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SPECIAL PROGRAMS

## OPTIONAL OPTIONS

- 32 bit VESA Local Bus
- 16-bit ISA Slots
- 1 to 5 HDD bay
- CD ROM or 5 25' FDD bay
- Ports for 2S, 1P, Ext. keyboard, Video Monitor
- Internal Speakers
- Switching 110/220v
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- Solid Platform for External Monitor

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|---|---|---|---|
| | 120MB | 200MB | 120MB |
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| 486SLC2-50 | $1349 | $1449 | - |
| 486SX-33 | $1399 | $1499 | $1999 |
| 486DX-33 | $1749 | $1849 | $2249 |
| 486DX2-50 | $1899 | $1999 | $2399 |
| 486DX2-66 | - | $2199 | $2599 |

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Convenient, upgradable architecture has arrived with the AcerNote 780cx. It features a revolutionary modular design that makes upgrading components and servicing easy. That's important, because when you're traveling with your notebook, your system administrator won't be around to help you.

### Add New Features As They Are Announced

As higher capacity hard drives become available, you can plug them in yourself with the easy-to-open Acer SmartCase.™ And look forward to being able to grow into the latest and greatest features as they are announced.

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## AcerNote 780cx IntelDX4™/75MHz

- IntelDX4/75MHz processor with built-in 16KB cache and coprocessor
- 8MB system RAM
- SmartCase™ easy-to-open modular housing for easy upgrades and serviceability
- Easily upgradable 340MB 2.5" hard drive
- Easy-to-remove keyboard for easy memory and BIOS upgrade
- EasyTrac™ centrally-located removable trackball
- PCMCIA Type III slot (equivalent to two stacked Type II slots)
- Local bus accelerated graphics
- Suspend-to-Disk feature, "No-Reboot" CMOS setup and Suspend-Resume hot button preserves battery life
- 9.5" active-matrix TFT color LCD
- Simultaneous LCD/CRT display
- Slim 8.66" x 11.4" x 2.1" case weighs 6.4 lbs, including NiMH battery pack
- Graphic battery gauge indicates remaining battery life
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intel inside

### AcerNote Gives You Easy Upgrades!

You also get the same convenient, upgradable architecture in the AcerNote 760cx as in the higher-priced 780cx. A revolutionary modular design makes upgrading components and servicing easy. If you're on the road when you need more storage or memory, you can simply plug in off-the-shelf components yourself.

### Suspend/Resume Hot Button Saves You Time!

The AcerNote 760cx offers time-saving benefits for the traveler, including the ability for you to jump right back into your applications from where you left off. By using a "hot button" you can close down and re-enter your work instantly, without having to wait for the usual boot-up procedure. This power-saving feature assures a 3-5 hour battery life.

### Assistance Around The Globe

Because the most powerful notebook does you no good if it's not working when you need it, the AcerNote series is backed by a one-year, 24-hour replacement warranty in the U.S. and Canada. To assure you support in over 20 countries worldwide, a free one-year Acer International Travelers Warranty is also included.

WARRANTY

### 30-Day Money-Back Guarantee

We are so sure that you'll be totally satisfied with your new Acer system that we're offering a full 30-day money-back guarantee—no questions asked.

## AcerNote 760 i486DX2/50MHz

NEW

- i486DX2/50MHz processor with built-in 8KB cache
- 4MB system RAM
- SmartCase easy-to-open modular housing for upgradability and servicability
- Easily upgradable 250MB 2.5" hard drive
- Easy-to-remove keyboard for quick memory and BIOS upgrade
- EasyTrac centrally-located removable trackball
- PCMCIA Type II slot (equivalent to two stacked Type II slots)
- Local bus accelerated graphics
- Suspend-to-Disk feature, "No-Reboot" CMOS setup and Suspend-Resume hot button preserves battery life
- 9.5" dual-scan passive-matrix LCD displays 256 colors
- Simultaneous LCD/CRT display
- Slim 8.66" x 11.4" x 1.8" case weighs 6.4 lbs, including NiMH or NiCad battery pack
- Graphic battery gauge indicates remaining battery life
- One year 24-hour replacement warranty in the U.S. and Canada

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## AcerNote 735c 486SX/33MHz
### The Value Winner For Presentations.

- Intel SL-Enhanced 486SX/33MHz Processor
- 4MB System RAM
- 2 PCMCIA Type II Slots/1 Type III Slot
- 9.5" Dual-Scan Passive-Matrix Color Display
- 209MB IDE Hard Disk Drive
- Palmrest with Integrated Trackball
- Local Bus Video with 512KB VRAM
- MS-DOS 6.2, Microsoft Windows 3.1
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intel inside pentium processor

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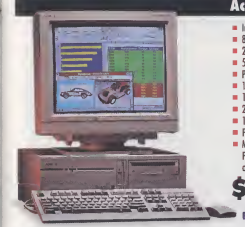

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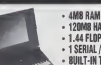

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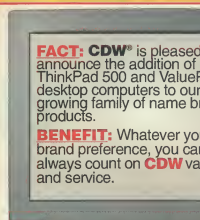

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| WYSE 150 AMBER, GREEN, WHITE | 265.45 |
| WYSE 160 AMBER, GREEN, WHITE | 329.88 |
| WYSE 325 COLOR | 427.40 |

### MULTIMEDIA, SOUND, CD

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|---|---|
| ALTEC LANSING ACS300 SPKRS/SW | 239 69 |
| Beethoven Int MM Explorer Kit w/ 16 bit sound | 329 88 |
| Beethoven Int MM Intro Kit | 186.74 |
| CDW 4 CD EDUTAINMENT BUNDLE* | 65.16 |
| CDW 5 CD BUNDLE* | 129.17 |
| CDW 5 CD BUSINESS BUNDLE* | 119 86 |
| CDW 5 CD ENTERTAINMENT BUNDLE* | 79 33 |
| CREATIVE LABS DigitalEdge MM Kit | 627 17 |
| CREATIVE LABS DISCOVERY 16 INT | 328.88 |
| CREATIVE LABS SB 18 AWE32 | 291 42 |
| CREATIVE LABS SB 16 SCSI | 177 90 |
| CREATIVE SB 16 ASP MCD | 175.67 |
| DIAMOND SONIC SOUND BASIC | 224.58 |
| DIAMOND SONIC SOUND LX | 109.30 |
| MEDIA VISION CRITICAL PATH | 44.53 |
| MEDIA VISION MEMPHIS SYS | 518 75 |
| MEDIA VISION PRO 16 SYSTEM II BUNDLE | 489.88 |
| MEDIA VISION PRO AUDIO 16 BASIC | 79 51 |
| MEDIA VISION PRO AUDIO SPECT 16 | 98 53 |
| MEDIA VISION PRO AUDIO STUDIO 18 | 124 62 |
| MICROSOFT BOOKSHELF CD | 119.89 |
| MICROSOFT CINEMANIA 1994 | 52 88 |
| MICROSOFT WIN SND SYS V2.0 | 52 95 |
| MS ENCARTA 1994 | 85.24 |
| MS MULTIMEDIA BEETHOVEN | 52.88 |
| MS WIN SND SYS V2 0 W/BOARD | 139.20 |
| ORCHID GAMEWAVE 32 | 138.40 |
| ORCHID SOUNDWAVE 32 | 197 72 |
| PROCOM EXT MULTIMEDIA STATION | 789.46 |
| PROCOM INT MULTIMEDIA STATION | 739 16 |
| SONIC SOUND PRO UPG KIT | 98 45 |
| SONY DSKTOP LIB EXT W/SND 2X | 479 54 |
| SONY DSKTOP LIB INT W/SND 2X | 467.73 |
| SONY DSKTOP LIBRARY INT 2X | 234.10 |
| SOUND BLASTER PRO DLX | 79.00 |
| TURTLE BEACH MONTEREY SND CRD | 349 77 |
| TURTLE BEACH MULTISOUND | 427.88 |

*AVAILABLE ONLY WITH CD-ROM DRIVE PURCHASE CALL FOR DETAILS

### CD-ROM & OPTICAL DRIVES

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|---|---|
| Beethoven 260ms Int CD-ROM Kit | 178.73 |
| CHINON CDS535 INT CD-ROM KIT | 347.60 |
| CHINON CDX535 EXT CDROM KIT | 427 88 |
| NEC 3XE EXTERNAL | 558.92 |
| NEC 3XI INTERNAL | 468 00 |
| NEC 3Xp Portable | 427 59 |
| ORCHID CDS3110 INT | 194 88 |
| Pioneer DRM604X 6 DISC QUADRASPIN | 1149.00 |
| PLEXTOR 3028 240MS INT KIT | CALL! |
| PLEXTOR 3028 W/PA SPECTRUM 18 | CALL! |
| PLEXTOR 5028 240MS EXT KIT | CALL! |
| PLEXTOR 5028 W/PA SPECTRUM 18 | CALL! |
| SONY CDU-33A Int 2X CD-ROM Kit | 179.78 |
| SONY CDU535 INT CD-ROM | 274.72 |
| SONY CDU561 INT SCSI 2X CD-ROM | 289 83 |
| SONY CDU7205N EXT CD-ROM | 449 88 |
| SYDOS PARALLEL PORT CD-ROM | 289 49 |
| Toshiba 3401 EXT SCSI 4 DRIVE TOWER | 2535 08 |
| Toshiba 3401 EXT SCSI CD-ROM | 468 80 |
| Toshiba 3401 EXT SCSI CD-ROM W/ADPT | 599.95 |
| Toshiba 3401 INT SCSI CD-ROM | 349.22 |
| Toshiba 3401 INT SCSI CD-ROM W/ADPT | 519.55 |

### PLOTTERS, DIGITIZERS & SCANNERS

**KURTA**

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|---|---|
| IS/ONE 12 X 12 4 BUTTON | 295.25 |
| IS/ONE 12 X 12 12 BUTTON | 298.82 |
| XLP 12 X 12 4 BUTTON & STYLUS | 219 55 |
| XLP 12 X 18 16 BUTTON | 442 60 |
| XGT 12 X 12 | 343.98 |

**CalComp**

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|---|---|
| DB III 12X12 4 BUTTON | 248 90 |
| DB III 12X12 16 BUTTON | 248 90 |
| DB III 12X18 W/PRES PEN | 399 85 |
| DB III 12X18 16 BUTTON CORDLESS | 696 85 |
| SLATE 12X12 W/PRES PEN | 363 40 |
| SLATE 12X12 W/16 BUTTON | 239.91 |

**Canon**

| | |
|---|---|
| IX4015 COLOR SCANNER | 997.42 |

**Summagraphics.**

| | |
|---|---|
| SUMMASKETCH III 12 X 12 16 BUTTON | 253 90 |
| SUMMASKETCH III 18 X 12 4 BUTTON | 524.44 |

**HOUSTON INSTRUMENT**

| | |
|---|---|
| HI 7100 A-D SIZE 8 PEN | 2598.78 |
| HI 7200 A-F SIZE 8 PEN | 3387.22 |

**HEWLETT PACKARD**

| | |
|---|---|
| HP SCANJET IIP | 509.98 |
| HP SCANJET IIP DOCUMENT FEEDER | 269.93 |
| HP SCANJET IICX W/ ISA | 995.50 |
| HP SCANJET IICX DOCUMENT FEEDER | 474 72 |
| IICX TRANSPARENCY ADAPT | 633.26 |

**EPSON**

| | |
|---|---|
| ACTIONSCANNER ES600C | 796 86 |
| ACTIONSCANNER ES800C | 1065 00 |
| ACTIONSCANNER ES800C PRO | 1238.53 |

### VIDEO PRODUCTS

**VGA & SUPER VGA MONITORS**

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|---|---|
| MAG INNOVISION MX15F | 497.15 |
| MAG INNOVISION DX15F | 435.90 |
| MAG INNOVISION MX17F | 877.40 |
| MAG INNOVISION MX17FG | 927.53 |
| MAG INNOVISION DX17F | 698 00 |
| MAGNAVOX CM2089 14" 28 | 257.88 |
| MAGNAVOX CM2099 14" 28 NI | 264 00 |
| MAGNAVOX CM4017 17" | 648.20 |
| MAGNAVOX 20CM64 20" *SPECIAL!** | 999 00 |

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|---|---|
| NANAO F340iW 15" | 659.00 |
| NANAO F550i 17" | 999 00 |
| NANAO F550iW 17" | 1107.00 |
| NEC 3V 15" | 467.49 |
| NEC 3FGE 15" | 557.17 |
| NEC 4FGE 15" | 617.19 |
| NEC 5FGE 17" | 998 50 |
| NEC 5FGp 17" | 1097 21 |
| NEC 6FGp 21" | 1997 00 |
| PANASONIC C1381i 14" | 335 76 |
| PHILIPS 1764DC 17" | 719 50 |
| PHILIPS BRILLIANCE 17" | 995 00 |
| PHILIPS BRILLIANCE 21" | 2239 45 |
| SONY CPD1430 14" | 497 00 |
| SONY CPD1730 17" | 897.00 |
| SONY 17SE 17" | 1147 00 |
| SONY GDM2038 20" | 1999.84 |

**VGA & SUPER VGA DISPLAY CARDS**

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|---|---|
| ADS VGA TO TV ELITE | 224.57 |
| ATI Graphics Ultra+ 2MB | 237.58 |
| ATI Graphics Ultra Pro 2MB | 357 56 |
| ATI Graphics Ultra Pro 2MB EISA | 394 92 |
| ATI Graphics Ultra Pro 2MB VLB | 357.59 |
| CREATIVE LABS VIDEO BLASTER | 339.02 |
| CREATIVE LABS VIDEO SPIGOT | 237.73 |
| DIAMOND STEALTH PRO 1MB | 237.08 |
| DIAMOND STEALTH PRO 2MB | 316 58 |
| DIAMOND SPEEDSTAR PRO 1MB | 107 43 |
| DIAMOND VIPER VLB 2MB | 387 86 |
| HERCULES GRAPHITE PRO 1MB | 255.46 |
| HERCULES GRAPHITE 2MB | 368 45 |
| HERCULES DYNAMITE VLB | 157 30 |
| INTEL SMART VIDEO RECORDER | 486 88 |
| ORCHID FAHRENHEIT 1280+ | 142 52 |
| ORCHID FAHRENHEIT VA | 172 97 |
| ORCHID CELSIUS VLB 1MB | 209.55 |
| ORCHID CELSIUS VLB 2MB | 249 94 |

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|---|---|---|---|
| T1910CS 200MB | 2277.11 | T3400/120MB | 2197.00 |
| T1950CS/120MB | 2477.17 | T3400CT/120MB | 3428.00 |
| T1950CS/200MB | 2697.78 | T4600/200MB | 2299.00 |
| T1950CT/120MB | 2799.00 | T4600C/200MB | 3999.00 |
| T1950CT/200MB | 2999.00 | T4600C/340MB | 4369.00 |
| T1950CT/320MB | 3399.00 | | |

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|---|---|
| T4700CS/200MB DUAL CLR | 3519.00 |
| T4700CS/320MB DUAL CLR | 3819.00 |
| T4700CT/200MB ACT CLR | 4499.00 |
| T4700CT/320MB ACT CLR | 4849.00 |
| T4800CT/500MB ACT COL | 5495.47 |
| T6600C/510MB ACT CLR | 6099.00 |
| T6600C/510MB CD ACT CLR | 6599.00 |

#### AST BRAVO SERIES

| | | | |
|---|---|---|---|
| LC 4/100D 270MB | 2251.41 | MT P60 540MB CD | 3425.44 |
| LC 4/100D 340MB | 2715.86 | KING 4/33S 170MB | 1126.07 |
| LC 4/100D 540MB | 2616.65 | KING 4/33S 270MB | 1352.62 |
| LP 4/33D 170MB | 1399.84 | KING 4/33D 170MB | 1363.78 |
| LP 4/33D 340MB | 1874.77 | KING 4/33D 270MB | 1589.33 |
| LP 4/66D 170MB | 1829.52 | KING 4/33D 210MB CD | 1816.86 |
| LP 4/66D 340MB | 2259.57 | KING 4/50S 170MB | 1339.46 |
| MT 4/33D 170MB | 1495.97 | KING 4/50S 270MB | 1568.01 |
| MT 4/33D 340MB | 1929.46 | KING 4/50S 210MB CD | 1794.56 |
| MT 4/66D 170MB | 1907.15 | KING 4/66D 270MB | 1858.18 |
| MT 4/66D 340MB | 2359.82 | KING 4/66D 540MB | 2233.18 |
| MT P60 270MB | 2595.36 | KING 4/66D 340MB CD | 2334.60 |

| | |
|---|---|
| NOTEBOOK 80MB MONO | 1592 15 |
| NOTEBOOK 120MB MONO | 1458 70 |
| NOTEBOOK 170MB MONO | 1555 45 |
| NOTEBOOK 170MB COLOR | 2398.00 |

#### Canon

| | |
|---|---|
| NOTEJET 4/25 180MB | 2393 29 |
| NOTEJET 4/25 120MB COLOR | 2769 58 |
| NOTEJET 4/25 200MB COLOR | 3089 57 |
| INNOVA 4/33L SX 170MB | 929 64 |
| INNOVA 4/33L SX 240MB | 1025.71 |
| INNOVA 4/50L 170MB | 1329.55 |
| INNOVA 4/50L 240MB | 1408 96 |
| INNOVA 4/66L 170MB | 1538.57 |
| INNOVA 4/88L 240MB | 1614 88 |

#### EPSON

| | |
|---|---|
| ActionNote 4SLC50 120MB+modem | 1656.62 |
| ActionNote 4SLC50 180MB+modem | 1598.00 |
| ActionNote 500C 120MB+modem | 1977.92 |
| ActionNote 500C 180MB+modem | 2063.91 |
| ActionNote 700 120MB mono | 1897 48 |
| ActionNote 700C 120MB pas clr | 2477 72 |
| ActionNote 700C 210MB pas clr | 2567 78 |
| ActionNote 700C 260MB pas clr | 2647 79 |
| ActionNote 700CX 210MB act clr | 3227.84 |

#### IBM

| | |
|---|---|
| ThinkPad 500 4/50DX2 85MB | 1599 00 |
| ThinkPad 500 4/50DX2 170MB | 1899.00 |

**PS/ValuePoint Systems**

| | | | |
|---|---|---|---|
| 4/25SX Si 120MB | 882.45 | 4/33 MT 340MB | 1819.40 |
| 4/25SX Si 212MB | 983.45 | 4/50DX2 MT 212MB | 1719.50 |
| 4/33DX Si 120MB | 1248.75 | 4/50DX2 MT 420MB | 2186.70 |
| 4/33DX Si 212MB | 1359.75 | 4/66DX2 MT 340MB | 2264.40 |
| 4/66DX2 Si 120MB | 1637.25 | 4/66DX2 MT 527MB | 2691.75 |
| 4/66DX2 Si 212MB | 1748.25 | Pentium 5/60 527MB | 3674.10 |
| 4/33 MT 212MB | 1665.00 | | |

#### NEC

**VERSA NOTEBOOKS**

| | | | |
|---|---|---|---|
| 4/40 120MB Mono | 2584 43 | 4/50 209MB Color | 4427.34 |
| 4/40 120MB Color | 3747.30 | 4/50 340MB Mono | 3658 79 |
| 4/40 250MB Mono | 2999 87 | 4/50 340MB Color | 4797.59 |
| 4/40 250MB Color | 4147 81 | 4/75 340MB Color | 5199.31 |
| 4/50 209MB Mono | 3258.00 | | |

| | |
|---|---|
| READY 4/25S 170MB Multimedia | 1436.70 |
| READY 4/33S 210MB Multimedia | 1798.71 |
| IMAGE III 4/50 210MB | 1719.00 |
| IMAGE III 4/50 420MB | 1978 62 |
| POWERMATE 4/33SX 170MB | 1129 54 |
| POWERMATE 4/50DX2 210MB | 1388 27 |
| POWERMATE 4/66DX2 210MB | 1727 72 |

#### PACKARD BELL

| | |
|---|---|
| Diplomat 4/25 170MB mono | 1969.60 |
| Statesman 4/50DX2 200MB mono | 1479 97 |
| Statesman 4/50DX2 200MB color | 2609.04 |
| Force Multimedia 4/25 210MB | 1158.36 |
| Force Multimedia 4/33SX 340MB | 1338 58 |
| Force Multimedia 4/50DX2 420MB | 1549.47 |
| Force Multimedia 4/66DX2 420MB | 1979 25 |
| Force Multimedia 5/60 420MB | 2405 05 |
| Force 4/50SX2 340MB | 1178.39 |
| Force 4/66DX2 420MB | 1549 47 |
| Force MT 4/66DX2 420MB | 1729.70 |

#### TEXAS INSTRUMENTS

| | |
|---|---|
| TM4000E SX/25 120MB MONO | 1697 57 |
| TM4000 DX/25 200MB MONO | 2177 86 |
| TM4000E SX/25 120MB ADV COLOR | 1879 46 |
| TM4000E DX2/40 200MB PAS COLOR | 2498 35 |
| TM4000E OX2/50 200MB MONO | 2427 06 |
| TM4000E DX2/50 200MB DUAL COLOR | 2736 56 |
| TM4000E 4/50 200MB ACTIVE COLOR | 3398 40 |
| TM4000E DX4/75 340MB COLOR | 4447 70 |
| TM4000E DX4/75 455MB COLOR | 4947 32 |

### COMPUTERS

#### SHARP NOTEBOOKS

| | |
|---|---|
| 486/33 200MB PAS CLR W/TRKBALL | 2597.37 |
| 486/33 200MB ACT CLR W/TRKBALL | 2997.75 |

### DOT MATRIX & LASER PRINTERS

#### OKIDATA

| | | | |
|---|---|---|---|
| 184 TURBO | 219 14 | ML591 | 585.87 |
| ML320 | 304 45 | Pacemark 3410 | 1222 92 |
| ML321 | 432 43 | OL400E | 499 98 |
| ML380 | 214.95 | OL410E | 649 31 |
| ML395 | 989.32 | OL810 | 905 50 |
| ML395C | 1039 74 | OL830+ | 1079 11 |
| ML520 | 369.82 | OL850 PS | 1199 20 |
| ML521 | 495 18 | OOC-IT 4000 | 2245 10 |
| ML590 | 429.51 | | |

#### Canon

| | | | |
|---|---|---|---|
| BJ10SX | 249 88 | BJC600 COLOR | 578.25 |
| BJ200E | 289 00 | LBP430 LASER | 588 50 |
| BJ230 | 388.00 | 600DPI 8PPM | 1377.51 |

#### EPSON

| | | | |
|---|---|---|---|
| AP2250 | 115.63 | LO870 | 444.91 |
| AP3250 | 171.95 | LO1170 | 609.93 |
| AP3260 | 197.00 | LO2550 | 898.08 |
| LX810 | 164.95 | OFX5000 Plus | 1364.86 |
| FX870 | 267 59 | DFX8000 | 2269 45 |
| FX1170 | 354 95 | STYLUS 300 | 228 80 |
| LO570+ | 237 97 | STYLUS 800* | 251.97 |
| LO1070+ | 365.35 | Action Laser1500 | 656.70 |

*AFTER $25 MANUFACTURER REBATE (ENDS 5/30/94)

#### IBM LEXMARK LASER PRINTERS

| | |
|---|---|
| 4037 5E 5PPM | 657.17 |
| 4029-10 10PPM | 1115.42 |
| 4039-10R 10PPM | 1339.46 |
| 4039-10RD 10PPM DUPLEX | 1839 77 |
| 4039-12R 12PPM | 1689.76 |
| 4039-12L 12PPM | 2149 54 |
| 4039-16L 16PPM | 2735 36 |
| WinWriter 600 NEW! | 1197.38 |

#### NEC

| | | | |
|---|---|---|---|
| P3200 | 219.00 | Silentwriter 640 | 788.58 |
| SuperScript 610 | 479.27 | Silentwriter 1097 | 1377.60 |

#### Panasonic

| | | | |
|---|---|---|---|
| 1150 | 133 49 | 2624 | 409 49 |
| 1824 | 385.20 | 3123 NEW | 249 00 |
| 2023 | 202.97 | 4410 LASER | 547 15 |
| 2123 | 243 37 | 4430 LASER | 686.91 |
| 2124 | 318.41 | 4440 LASER | 1019.76 |

#### TEXAS INSTRUMENTS

| | |
|---|---|
| MICROMARC INKJET* | 248.00 |
| MICROWRITER BASIC | 517 16 |
| MICROWRITER PS23 | 677 22 |
| MICROWRITER PS65 | 937.20 |
| MICROLASER PRO 800 PS23* * | 1308 00 |
| MICROLASER PRO 800 PS85** | 1468 00 |
| POWERSTEP UPG- mL600 | 274.68 |

* after $30 manufacturer rebate (ends 6/30/94)
** after $60 manufacturer rebate (ends 6/30/94)

#### SHARP PRINTERS

| | |
|---|---|
| SHARP JX9400 300DPI 4PPM | 477.09 |
| SHARP JX9460PS 600DPI 6PPM | 949.88 |

#### HEWLETT PACKARD

| | | | |
|---|---|---|---|
| Deskjet Portable 310 | 367.00 | LaserJet 4MP | 1469.89 |
| Deskjet 520 | 289.00 | LaserJet 4* | 1399.50 |
| Deskjet 560C | 569.00 | LaserJet 4plus NEW | 1496.60 |
| Deskjet 1200C | 1449.61 | LaserJet 4M* | 1989.64 |
| Deskjet 1200C PS | 2095.47 | LaserJet 4M plus NEW | 1998.27 |
| Paintjet XL300 | 2258.93 | LaserJet 4SI | 2998.95 |
| LaserJet 4L | 679.56 | LaserJet 4SI MX | 4508.36 |
| LaserJet 4P | 979.74 | | |

*while supplies last

#### COSTAR

| | |
|---|---|
| LabelWriter II DOS/Win | 178.00 |
| Address Express | 329 00 |

### HARD DRIVES & CONTROLLERS

#### Maxtor

| | | | |
|---|---|---|---|
| 131MB IDE | 199.10 | 345MB IDE | 298 80 |
| 170MB IDE | 205.08 | 345MB SCSI | 365.63 |
| 245MB IDE | 238.46 | 540MB IDE | 459.30 |

#### MICROPOLIS

| | | | |
|---|---|---|---|
| 1050MB IDE | 824.49 | 1 050GB SCSI AV | 969 35 |
| 1050MB SCSI | 828 40 | 1 765GB SCSI AV | 1289.38 |
| 1 7GB SCSI | 1129.86 | 3GB SCSI | 2098.00 |

### HARD DRIVES & CONTROLLERS

#### CONNER

| | | | |
|---|---|---|---|
| 210MB IDE | 219.39 | 426MB IDE | 325.32 |
| 343MB IDE | 299 87 | CP30544 540MB IDE | 539.84 |
| 343MB SCSI | 335.99 | CFP1060S 1GB SCSI | 896.04 |

#### Seagate

| | | | |
|---|---|---|---|
| 130MB IDE | 187.81 | 535MB SCSI-2 | 649 44 |
| 200MB IDE | 214.74 | 1 0GB SCSI 2 | 897 20 |
| 261MB IDE | 237.80 | 1 05GB SCSI | 848.00 |
| 341MB IDE | 295.71 | 1 69GB SCSI-2 | 1599.31 |
| 452MB IDE | 348.25 | | |

#### WESTERN DIGITAL

| | | | |
|---|---|---|---|
| Caviar 210MB IDE | 221.99 | Caviar 420MB IDE | 319.00 |
| Caviar 250MB IDE | 239.24 | Caviar 540MB IDE | 456.00 |
| Caviar 340MB IDE | 299 64 | | |

#### CONTROLLERS

| | |
|---|---|
| ACCULOGIC IDE W/1PAR, 2SER, 1GAME | 35 06 |
| ACCULOGIC IDE W/BIOS | 48 90 |
| ACCULOGIC VLB IDE | 98 76 |
| ADAPTEC 1510A SCSI-2 CO KIT | 89 86 |
| ADAPTEC 1542CF SCSI-2 | 265 45 |
| ADAPTEC 2742T EISA SCSI-2 | 339 22 |
| ADAPTEC 2842 VLB SCSI-2 | 299 45 |
| Promise IDE ISA Cache | 99 88 |
| Promise IDE VLB Cache | 143 35 |

### MODEMS & COMMUNICATIONS

#### US Robotics

**SPORTSTER MODEMS**

| | | | |
|---|---|---|---|
| 14 4 INT | 125.50 | 14 4 EXT W/FAX | 139.50 |
| 14 4 INT W/FAX | 119 50 | Worldport 14 4 | 149.00 |
| 14 4 EXT | 135.50 | | |

**COURIER MODEMS**

| | |
|---|---|
| V 32TERBO INT | 333.60 |
| V 32TERBO INT W/FAX | 345.64 |
| V 32TERBO EXT | 378 23 |
| V 32TERBO EXT W/FAX | 395.08 |
| DUAL STD TERBO INT W/FAX | 708 13 |
| DUAL STD TERBO EXT W/FAX | 732.63 |

#### Hayes

| | |
|---|---|
| ACCURA 2400B INT | 59.10 |
| ACCURA 2400 EXT | 69.25 |
| ACCURA 24EC + FAX 96 INT | 89.49 |
| ACCURA 96 + FAX 96 INT | 139.95 |
| ACCURA 96 + FAX 96 EXT | 147.90 |
| ACCURA 14 4 + FAX 14 4 INT | 148.20 |
| ACCURA 14 4 + FAX 14 4 EXT | 156 80 |
| OPTIMA 2400 V 42BIS EXT | 112 64 |
| OPTIMA 24 + FAX 96 EXT | 119.34 |
| OPTIMA 9600 EXT | 338 50 |
| OPTIMA 96 + FAX 96 EXT | 354 42 |
| OPTIMA 14 4 EXT | 363 80 |
| OPTIMA 14 4 + FAX 14 4 EXT | 374 30 |
| OPTIMA 14 4 + FAX 14 4 Pocket | 296 93 |
| OPTIMA 28 8K V FC W/FAX EXT | 439 13 |
| ULTRA 9600 EXT | 569 18 |
| ULTRA 14 4 EXT | 645.20 |
| ESP Accelerated Single/Dual Serial | 79.50/121.12 |

#### PRACTICAL PERIPHERALS

| | |
|---|---|
| 2400B INT | 59 68 |
| 2400 EXT | 69 95 |
| PM2400FX 2400 INT W/FAX | 76 95 |
| PM2400EF 2400 V 42 EXT W/FAX | 107.40 |
| PM9600FX 9600 INT W/FAX | 139 77 |
| PM9600FXMT 9600 EXT W/FAX | 149 88 |
| PM14400FX 14 4 INT W/FAX | 149 50 |
| PM14400FXMT 14 4 EXT W/FAX | 169 55 |
| PM14400FXSA 14 4 EXT W/FAX, LCO | 359 45 |
| PM14400FXP 14 4 POCKET W/FAX | 287.50 |

#### intel

**SATISFAXTION MODEMS**

| | | | |
|---|---|---|---|
| 200 INT | 209 50 | 400 EXT | 309.59 |
| 400 INT | 273.05 | | |

**FAX MODEMS**

| | | | |
|---|---|---|---|
| 2400 V 42BIS INT | 99 00 | 9600 EXT W/FAX | 149 60 |
| 2400 V 42BIS EXT | 114 52 | 14 4 INT W/FAX | 119 00 |
| 9600 INT W/FAX | 133.76 | 14 4 EXT W/FAX | 139.50 |

#### BOCA

| | |
|---|---|
| BOCA 14 4K INT W/FAX | 105 00 |
| BOCA 14 4K EXT W/FAX | 147 61 |
| V FC 24K BPS INT W/FAX | 199 59 |
| V FC 24K BPS EXT W/16550 I/O BOARD | 229 64 |

### BATTERY BACKUP AND UPS

#### AMERICAN POWER

| | | | |
|---|---|---|---|
| BACK UPS 250 | 99.34 | BACK UPS 1250 | 498 77 |
| BACK UPS 400 | 159 83 | SMART UPS 400 | 299 95 |
| BACK UPS 450 | 189.88 | SMART UPS 600 | 363 38 |
| BACK UPS 600 | 263 67 | SMART UPS 900 | 579 55 |
| BACK UPS 900 | 374 15 | SMART UPS 1250 | 725.90 |

| | |
|---|---|
| SURGEARREST NETWORK NEW | 34 97 |
| SURGEARREST PRO NEW | 33.58 |
| SURGEARREST NETWORK + PHONE | 48 65 |
| LINE-R 600 | 119.09 |

### BATTERY BACKUP AND UPS

#### TRIPP LITE

| | | | |
|---|---|---|---|
| BC250 | 99 11 | BC600 LAN | 249 00 |
| BC400 | 155.59 | BC750 LAN | 313 90 |
| BC500 | 189.42 | BC900 LAN | 369.67 |
| BC500 LAN | 199.40 | BC1250 LAN | 459.10 |

**SMART UPS SERIES NEW**

| | |
|---|---|
| SMART 250 LAN | 232.46 |
| SMART 400 LAN | 279 87 |
| SMART 500 LAN | 309 09 |
| SMART 600 LAN | 334 91 |
| SMART 750 LAN | 428.53 |
| SMART 900 LAN | 525 64 |
| SMART 1250 LAN | 659.66 |
| ISOBAR 4 OUTLET | 38 95 |
| ISOBAR 6 OUTLET | 46 38 |

### PCMCIA

| | |
|---|---|
| BOCA 14 4K OATA/FAX | 259 70 |
| DATARACE 14 4K W/FAX | 238.24 |
| OATARACE 2400 W/FAX | 168.70 |
| DSP Tech Portable Sound+ | 154 34 |
| EAGLE NE200C ETHERNET COAX | 189.74 |
| EAGLE NE200T ETHERNET | 209.35 |
| HAYES OPTIMA 14 4 W/FAX | 267.70 |
| IBM TOKEN RING 16/4 | 374 35 |
| INTEL 14 4 W/FAX | 285 00 |
| INTEL 2400 W/FAX | 163 00 |
| INTEL 9600 W/FAX | 242 00 |
| LINKSYS ETHERNET 10BT | 175.15 |
| LINKSYS ETHERNET COAX | 175 15 |
| MAXTOR MOBILEMAX 105MB HD | 449 55 |
| MEGAHERTZ 14 4 W/FAX | 295 49 |
| MEGAHERTZ GOLD 14 4 XJACK W/FAX | 309.31 |
| MEGAHERTZ 2400 XJACK W/FAX | 177 82 |
| MEGAHERTZ 9600 XJACK W/FAX | 237 07 |
| MINISTOR 42MB HARD DRV | 296 25 |
| NAT SEMI NE4100T ETHERNET 10BT | 179.56 |
| PRACTICAL 14 4K DATA/FAX | 269 61 |
| T CONRAD ETHERNET COAX | 228.44 |
| TRANTOR SLIM SCSI-2 | 279 45 |
| TURTLE BEACH Audio Advantage | 99 55 |
| USR WORLDPORT 14 4 W/FAX | 254.15 |
| XIRCOM TOKEN RING ADAPTER | 439 41 |
| XIRCOM ETHERNET 10BT | 212.19 |
| XIRCOM ETHERNET COAX | 214 79 |
| XIRCOM ETHERNET COMBO | 252 55 |

### MEMORY UPGRADES

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| AST POWEREXEC 486 4MB | CALL! |
| AST PREMIUM II 1MB CUPID SIMM | CALL! |
| AST PREMMIA 8MB UPG | CALL! |
| COMPAO DESKTOPS-ALL MODELS | CALL! |
| COMPAO CONTURA 486 8MB | CALL! |
| COMPAO CONTURA 4MB | CALL! |
| COMPAO LITE 4/25C 4MB | CALL! |
| EPSON ACTION LASER 2-8MB | CALL! |
| HP DESKJET 500 & 500C 256KB | CALL! |
| HP LASERJETS-ALL MODELS | CALL! |
| HP PAINTJET XL300 4MB | CALL! |
| IBM DESKTOPS-ALL MODELS | CALL! |
| IBM THINKPAD 700 4MB | CALL! |
| NEC SILENTWRITER 95 2MB | CALL! |
| NEC VERSA 4MB | CALL! |
| OKILASER 400 2MB | CALL! |
| OKILASER 800 2MB | CALL! |
| PANASONIC 4410, 4430 2-4MB | CALL! |
| PANASONIC P4450I 2MB | CALL! |
| TI MICROLASER 1MB | CALL! |
| TI TM4000 4MB | CALL! |
| TOSHIBA NOTEBOOKS-ALL MODELS | CALL! |

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### PROCESSOR/UPGRADES

| | |
|---|---|
| CYRIX 486DRX/2 Upg 40Mhz | 247 44 |
| INTEL OVERDRIVE 16/20MHZ | 297 65 |
| INTEL OVERDRIVE 25MHZ | 309 88 |
| INTEL OVERDRIVE 33MHZ | 434.65 |
| KINGSTON SX/NOW 25MHZ | 169.45 |
| KINGSTON SX/NOW 33MHZ | 196.25 |
| KINGSTON 486/NOW 33MHz | 255 52 |
| KINGSTON 486/NOW 33MHZ | 438 30 |

### MATH COPROCESSORS

| | |
|---|---|
| INTEL 387SX 16/20/25MHZ | 76 84 |
| INTEL 387SX 33MHZ | 89 90 |
| INTEL 387SL | 76.22 |
| INTEL 387DX | 79.83 |

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|---|---|---|---|---|---|---|---|---|
| 425SX/S | none | i486SX/25 | 4MB | 64MB | 3 (ISA) | 2(1) | 37725 | $715.95 |
| 425SX/S | 120MB | i486SX/25 | 4MB | 64MB | 3 (ISA) | 2(1) | 37727 | $882.45 |
| 425SX/S | 212MB | i486SX/25 | 4MB | 64MB | 3 (ISA) | 2(1) | 37728 | $993.45 |
| 433DX/S | None | i486DX/33 | 4MB | 64MB | 3 (ISA) | 2(1) | 37729 | $1082.25 |
| 433DX/S | 120MB | i486DX/33 | 4MB | 64MB | 3 (ISA) | 2(1) | 37730 | $1248.75 |
| 433DX/S | 212MB | i486DX/33 | 4MB | 64MB | 3 (ISA) | 2(1) | 37731 | $1359.75 |
| 466DX/S | none | i486DX2/66 | 4MB | 64MB | 3 (ISA) | 2(1) | 38053 | $1470.75 |
| 466DX/S | 120MB | i486DX2/66 | 4MB | 64MB | 3 (ISA) | 2(1) | 37732 | $1637.25 |
| 466DX/S | 212MB | i486DX2/66 | 4MB | 64MB | 3 (ISA) | 2(1) | 34651 | $1748.25 |
| 425DX/D | none | i486SX/25 | 4MB | 64MB | 5(ISA) | 3(2) | 38054 | $965.70 |
| 425SX/D | 170MB | i486SX/25 | 4MB | 64MB | 5(ISA) | 3(2) | 34956 | $1132.20 |
| 425SX/D | 245MB | i486SX/25 | 4MB | 64MB | 5(ISA) | 3(2) | 38055 | $1232.10 |
| 433DX/D | none | i486DX/33 | 4MB | 64MB | 5(ISA) | 3(2) | 38057 | $1048.95 |
| 433SX/D | 170MB | i486SX/33 | 4MB | 64MB | 5(ISA) | 3(2) | 38058 | $1399.00 |
| 433SX/D | 245MB | i486SX/33 | 4MB | 64MB | 5(ISA) | 3(2) | 35060 | $1515.35 |
| 433DX/D | none | i486DX/33 | 4MB | 64MB | 5(ISA) | 3(2) | 35010 | $1387.50 |
| 433DX/D | 212MB | i486DX/33 | 4MB | 64MB | 5(ISA) | 3(2) | 34957 | $1554.00 |
| 433DX/D | 340MB | i486DX/33 | 4MB | 64MB | 5(ISA) | 3(2) | 38061 | $1709.40 |
| 450DX2/D | none | i486DX2/50 | 4MB | 64MB | 5(ISA) | 3(2) | 38062 | $1443.00 |
| 450DX2/D | 212MB | i486DX2/50 | 4MB | 64MB | 5(ISA) | 3(2) | 38063 | $1609.50 |
| 450DX2/D | 340MB | i486DX2/50 | 4MB | 64MB | 5(ISA) | 3(2) | 34801 | $1764.90 |
| 466DX2/D | none | i486DX2/66 | 4MB | 64MB | 5(ISA) | 3(2) | 38064 | $1720.50 |
| 466DX2/D | 212MB | i486DX2/66 | 4MB | 64MB | 5(ISA) | 3(2) | 38065 | $1998.00 |
| 466DX2/D | 340MB | i486DX2/66 | 4MB | 64MB | 5(ISA) | 3(2) | 38066 | $2153.40 |
| 433DX/T | none | i486DX/33 | 4MB | 64MB | 8(ISA) | 4(2) | 39392 | $1498.50 |
| 433DX/T | 212MB | i486DX/33 | 4MB | 64MB | 8(ISA) | 4(2) | 39393 | $1665.00 |
| 433DX/T | 340MB | i486DX/33 | 4MB | 64MB | 8(ISA) | 4(2) | 39394 | $1820.40 |
| 450DX2/T | 212MB | i486DX2/50 | 4MB | 64MB | 8(ISA) | 4(2) | 39396 | $1720.50 |
| 450DX2/T | 420MB | i486DX2/50 | 4MB | 64MB | 8(ISA) | 4(2) | 39398 | $2186.70 |
| 466DX2/T | 340MB | i486DX2/66 | 4MB | 64MB | 8(ISA) | 4(2) | 39400 | $2264.40 |
| 466DX2/T | 527MB | i486DX2/66 | 8MB | 64MB | 8(ISA) | 4(2) | 39401 | $2691.75 |
| P60/D | 527MB | Pentium/60MHz | 16MB | 128MB | 2 (ISA) 2(PCI) | 3(2) | 33715 | $3674.10 |

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| 14" .28mm, 1280 x 1024 CRT | $419.00 | CDW 34204 |
| 15" .28mm, 1280 x 1024 Flat Square Tube | $569.00 | CDW 39404 |
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| 250 MB, 486SL/40 | $2999.87 | CDW 34105 |
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| 250 MB, 486SL/40 | $4147.81 | CDW 34107 |
| 209 MB, 486SL/50 | $4427.34 | CDW 34110 |
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| 576 | 577 | 578 | 579 | 580 | 581 | 582 | 583 | 584 | 585 | 586 | 587 | 588 | 589 | 590 | 591 | 592 | 593 | 594 | 595 |

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| 371 | 372 | 373 | 374 | 375 | 751 | 752 | 753 | 754 | 755 | 756 | 757 | 758 | 759 | 760 | 761 | 762 | 763 | 764 | 765 |
| 396 | 397 | 398 | 399 | 400 | 766 | 767 | 768 | 769 | 770 | 771 | 772 | 773 | 774 | 775 | 776 | 777 | 778 | 779 | 780 |
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| 521 | 522 | 523 | 524 | 525 | 841 | 842 | 843 | 844 | 845 | 846 | 847 | 848 | 849 | 850 | 851 | 852 | 853 | 854 | 855 |
| 546 | 547 | 548 | 549 | 550 | 856 | 857 | 858 | 859 | 860 | 861 | 862 | 863 | 864 | 865 | 866 | 867 | 868 | 869 | 870 |
| 571 | 572 | 573 | 574 | 575 | 871 | 872 | 873 | 874 | 875 | 876 | 877 | 878 | 879 | 880 | 881 | 882 | 883 | 884 | 885 |
| 596 | 597 | 598 | 599 | 600 | 886 | 887 | 888 | 889 | 890 | 891 | 892 | 893 | 894 | 895 | 896 | 897 | 898 | 899 | 900 |

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1. **Where do you use your computer?** (Check one only):
   A ☐ Home B ☐ Business C ☐ Both
2. **What kinds of computers do you use?** (Check all that apply).
   D. ☐ IBM/Compatible Laptop E. ☐ IBM/Compatible Desktop F. ☐ MAC
3. **Do you plan to buy any of the hardware or software mentioned below in the next three months?** (Check all that apply)

**HARDWARE**
G. ☐ PC
H. ☐ MAC
I. ☐ Laptop
J. ☐ Printer
K. ☐ Monitor
L. ☐ Disk/Tape Back-up
M. ☐ Add-in Board
N. ☐ Modem
O. ☐ Input Device
P. ☐ Local Area Network

**SOFTWARE**
Q. ☐ Accounting
R. ☐ Spreadsheet
S. ☐ Personal Finance
T. ☐ Desktop Publishing
U. ☐ Word Processor
V. ☐ Database Manager
W. ☐ Graphics
X. ☐ Utility
Y. ☐ Communications
Z. ☐ Windows/Multi-tasking
1. ☐ Programming Language/ Compiler
2. ☐ Integrated/Multifunction
3. ☐ CAD

4. **From which of the following sources do you purchase personal computer products?** (Check all that apply)
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   5. ☐ Mail Order Firms
   6. ☐ Direct from Manufacturers
   7. ☐ Other

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| 451 | 452 | 453 | 454 | 455 | 456 | 457 | 458 | 459 | 460 | 461 | 462 | 463 | 464 | 465 | 466 | 467 | 468 | 469 | 470 | 471 | 472 | 473 | 474 | 475 |
| 476 | 477 | 478 | 479 | 480 | 481 | 482 | 483 | 484 | 485 | 486 | 487 | 488 | 489 | 490 | 491 | 492 | 493 | 494 | 495 | 496 | 497 | 498 | 499 | 500 |
| 501 | 502 | 503 | 504 | 505 | 506 | 507 | 508 | 509 | 510 | 511 | 512 | 513 | 514 | 515 | 516 | 517 | 518 | 519 | 520 | 521 | 522 | 523 | 524 | 525 |
| 526 | 527 | 528 | 529 | 530 | 531 | 532 | 533 | 534 | 535 | 536 | 537 | 538 | 539 | 540 | 541 | 542 | 543 | 544 | 545 | 546 | 547 | 548 | 549 | 550 |
| 551 | 552 | 553 | 554 | 555 | 556 | 557 | 558 | 559 | 560 | 561 | 562 | 563 | 564 | 565 | 566 | 567 | 568 | 569 | 570 | 571 | 572 | 573 | 574 | 575 |
| 576 | 577 | 578 | 579 | 580 | 581 | 582 | 583 | 584 | 585 | 586 | 587 | 588 | 589 | 590 | 591 | 592 | 593 | 594 | 595 | 596 | 597 | 598 | 599 | 600 |

## PRODUCTS FEATURED IN EDITORIAL

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 601 | 602 | 603 | 604 | 605 | 606 | 607 | 608 | 609 | 610 | 611 | 612 | 613 | 614 | 615 |
| 616 | 617 | 618 | 619 | 620 | 621 | 622 | 623 | 624 | 625 | 626 | 627 | 628 | 629 | 630 |
| 631 | 632 | 633 | 634 | 635 | 636 | 637 | 638 | 639 | 640 | 641 | 642 | 643 | 644 | 645 |
| 646 | 647 | 648 | 649 | 650 | 651 | 652 | 653 | 654 | 655 | 656 | 657 | 658 | 659 | 660 |
| 661 | 662 | 663 | 664 | 665 | 666 | 667 | 668 | 669 | 670 | 671 | 672 | 673 | 674 | 675 |
| 676 | 677 | 678 | 679 | 680 | 681 | 682 | 683 | 684 | 685 | 686 | 687 | 688 | 689 | 690 |
| 691 | 692 | 693 | 694 | 695 | 696 | 697 | 698 | 699 | 700 | 701 | 702 | 703 | 704 | 705 |
| 706 | 707 | 708 | 709 | 710 | 711 | 712 | 713 | 714 | 715 | 716 | 717 | 718 | 719 | 720 |
| 721 | 722 | 723 | 724 | 725 | 726 | 727 | 728 | 729 | 730 | 731 | 732 | 733 | 734 | 735 |
| 736 | 737 | 738 | 739 | 740 | 741 | 742 | 743 | 744 | 745 | 746 | 747 | 748 | 749 | 750 |
| 751 | 752 | 753 | 754 | 755 | 756 | 757 | 758 | 759 | 760 | 761 | 762 | 763 | 764 | 765 |
| 766 | 767 | 768 | 769 | 770 | 771 | 772 | 773 | 774 | 775 | 776 | 777 | 778 | 779 | 780 |
| 781 | 782 | 783 | 784 | 785 | 786 | 787 | 788 | 789 | 790 | 791 | 792 | 793 | 794 | 795 |
| 796 | 797 | 798 | 799 | 800 | 801 | 802 | 803 | 804 | 805 | 806 | 807 | 808 | 809 | 810 |
| 811 | 812 | 813 | 814 | 815 | 816 | 817 | 818 | 819 | 820 | 821 | 822 | 823 | 824 | 825 |
| 826 | 827 | 828 | 829 | 830 | 831 | 832 | 833 | 834 | 835 | 836 | 837 | 838 | 839 | 840 |
| 841 | 842 | 843 | 844 | 845 | 846 | 847 | 848 | 849 | 850 | 851 | 852 | 853 | 854 | 855 |
| 856 | 857 | 858 | 859 | 860 | 861 | 862 | 863 | 864 | 865 | 866 | 867 | 868 | 869 | 870 |
| 871 | 872 | 873 | 874 | 875 | 876 | 877 | 878 | 879 | 880 | 881 | 882 | 883 | 884 | 885 |
| 886 | 887 | 888 | 889 | 890 | 891 | 892 | 893 | 894 | 895 | 896 | 897 | 898 | 899 | 900 |

Please answer questions below:

1. **Where do you use your computer?** (Check one only):
   A. ☐ Home B. ☐ Business C. ☐ Both
2. **What kinds of computers do you use?** (Check all that apply):
   D. ☐ IBM/Compatible Laptop E. ☐ IBM/Compatible Desktop F. ☐ MAC
3. **Do you plan to buy any of the hardware or software mentioned below in the next three months?** (Check all that apply):

**HARDWARE**
- G. ☐ PC
- H. ☐ MAC
- I. ☐ Laptop
- J. ☐ Printer
- K. ☐ Monitor
- L. ☐ Disk/Tape Back-up
- M. ☐ Add-in Board
- N. ☐ Modem
- O. ☐ Input Device
- P. ☐ Local Area Network

**SOFTWARE**
- Q. ☐ Accounting
- R. ☐ Spreadsheet
- S. ☐ Personal Finance
- T. ☐ Desktop Publishing
- U. ☐ Word Processor
- V. ☐ Database Manager
- W. ☐ Graphics
- X. ☐ Utility
- Y. ☐ Communications
- Z. ☐ Windows/Multi-tasking
- 1. ☐ Programming Language/Compiler
- 2. ☐ Integrated/Multifunction
- 3. ☐ CAD

4. **From which of the following sources do you purchase personal computer products?** (Check all that apply):
   4. ☐ Specialty Computer Retail Stores 5. ☐ Mail Order Firms 6. ☐ Direct from Manufacturers 7. ☐ Other

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|---|---|---|
| PowerExer 4/25SL | 4MB | $179 |
| | 16MB | $769 |
| PowerExec 3/25SL, 3/25SL-C, EL | 4MB | $189 |
| Premium Exer 286, 386SX/20, 25, 25C | 4MB | $149 |
| NEW Brava N8 486 | 4MB | $205 |
| | 16MB | $949 |

### Compaq

| | | |
|---|---|---|
| NEW Aero | 4MB | $249 |
| | 8MB | $429 |
| NEW Caererta 486 | 4MB | $269 |
| | 8MB | $559 |
| Contero 3/20, 3/25, 3/25c | 4MB | $175 |
| | 8MB | $325 |
| Contura 4/25 series | 4MB | $189 |
| | 8MB | $365 |
| LTE 386S/20 | 4MB | $229 |
| LTE Lite 20; 25; 25c, 25e | 4MB | $229 |
| | 8MB | $395 |
| | 16MB | $789 |
| LTE Lite 4/25c | 4MB | $219 |
| | 8MB | $399 |
| SLT 386s/20 | 4MB | $199 |

### IBM

| | | |
|---|---|---|
| NEW PS/2 CL57SX and ThinkPad 700, 700c, 720, 720c | 4MB | $209 |
| | 8MB | $389 |
| | 16MB | $1059 |
| NEW ThinkPad 710T | 4MB | $189 |
| | 8MB | $319 |
| NS1 Notebook (All) | 2MB | $99 |
| | 4MB | $189 |
| L40SX, N33SX, PS/Note 182 | 4MB | $185 |
| L40SX, PS/Note 182 | 8MB | $359 |

### NEC

| | | |
|---|---|---|
| NEW UltraLite Versa (all models) | 4MB | $229 |
| | 8MB | $449 |
| | 16MB (3.3V) | $959 |
| UltraLite III, SL/25C | 2MB | $79 |
| | 4MB | $169 |
| UltraLite SL/20, SL/20P | 2MB | $79 |
| | 6MB | $259 |
| ProSpeed 286, 386SX/16 | 4MB | $179 |

### Texas Instruments

| | | |
|---|---|---|
| TravelMate 3000 (all models) | 2MB | $79 |
| NEW TravelMate 4000 (all models) | 4MB | $189 |
| TravelMate WinSLC/25 | 2MB | $129 |

### Toshiba

| | | |
|---|---|---|
| T1000SE/LE/XE; 2000, 2000SX; SXe, T2200SX, T1800 Series | 2MB | $99 |
| | 4MB | $179 |
| | 8MB | $329 |
| T1200XE, 1600, 3100E | 2MB | $89 |
| T3100SX, 3200SX, SXC | 2MB | $79 |
| | 4MB | $169 |
| T3300SL | 4MB | $169 |
| | 8MB | $399 |
| | 16MB | $935 |
| NEW T3400 | 4MB | $229 |
| | 8MB | $449 |
| T4400, T6400 (all models) | 4MB | $209 |
| | 16MB | $699 |
| NEW T1900, T4500, T4600, T4700 (all models) | 8MB (3.3V) | $469 |
| | 16MB (3.3V) | $959 |
| T5400, T5200; T5200C, T8500 | 2MB | $89 |

### Zenith

| | | |
|---|---|---|
| NEW Z-Note 320L, 320Lb, 325L, 325Lc | 2MB | $108 |
| | 8MB | $384 |
| NEW Z-Nota 425 Series | 8MB (3.3V) | $549 |
| Z-Sport 420S, 425S | 4MB | $188 |
| MastersPort 386SL, SLC, SLe | 2MB | $90 |
| MastersPort 386SX | 2MB | $89 |
| SupersPort SX; 286e; SlimsPort | 2MB | $139 |
| SupersPort 286; 286e | 1MB | $139 |
| SupersPort 286e; SlimsPort | 4MB | $199 |

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**2x36**...... **$354**

| | |
|---|---|
| 1MB x 9-70ns (9 chip) | $46 |
| 512K x 36-70 (2MB) | $85 |
| 4MB x 9-70ns | $155 |
| 1MB x 36-70 (4MB) | $181 |
| 2MB x 36-70 (8MB) | $354 |

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|---|---|
| WorldPort 14,400 Fax, PCMCIA | $249 |
| Sportster 14,400 Fax, External | $145 |
| Sportster 14,400 Fax, Internal | $125 |

## MONITORS

### ADI

| | |
|---|---|
| • **MicroScan 3E+**, 14", 0.28mm, 1024x768 @ 72Hz Microprocessor-based digital controls, 30K-60KHz | $349 |
| • **MicroScan 4G**, 15"FST, 0.28mm, 1280x1024 NI @ 60Hz Microprocessor based digital controls, 30K-64KHz | $429 |
| • **MicroScan 5A**, 17"FST, 0.26mm, 1280x1024 NI @ 60Hz Microprocessor-based digital controls, 30K-64KHz | $819 |

## CPU UPGRADES

### Kingston

**SX/Now!** 386 CPU Upgrade

| | |
|---|---|
| 25MHz (SX) | $169 |
| 33MHz (SX) | $199 |

**SLC/Now!** 486 CPU Upgrade

| | |
|---|---|
| 25MHz (SLC) | $219 |
| 50MHz (SLC) | $299 |

### Cyrix

**486 Upgrades** (NEW)

| | |
|---|---|
| Cx486DRx²-33/66 | $349 |
| Cx486DRx²-16/32 | $269 |
| Cx486DRx²-20/40 | $269 |
| Cx486DRx²-25/50 | $309 |
| Cx486SRx²-25/50 | $269 |
| Cx486SRx²-20/40 | $249 |

### Intel

**Intel Math**

| | |
|---|---|
| 80387SX 16, 20, 25MHz | $85 |
| 80387DX 16, 20, 25, 33MHz | $89 |
| 80387SL Mobile 16, 20, 25MHz | $85 |

**Intel OverDrive Processors**

| | |
|---|---|
| 486SX20 with socket | $309 |
| 486SX25 with socket | $309 |
| 486DX25 without socket | $309 |
| 486DX33 without socket | $431 |
| 486DX33 or 486SX33 with socket | $431 |

## PERSONAL COMPUTER MEMORY

### AST

| | | | | | |
|---|---|---|---|---|---|
| NEW Premmia | | | | | |
| 4MB | 501159 001 | $152 | 8MB | 501159-002 | $369 |
| Brava 3/25s | | | | | |
| 2MB | 500710-004 | $96 | 8MB | 500824 002 | $319 |
| Advantage! 386SX/20; 25, Advantage! Pro SX/25, Brava 3/33s | | | | | |
| 2MB | 500962 001 | $89 | 8MB | 500962-002 | $289 |
| Advantage! Pro 486DX/33; SX/25, Bravo LC 4/25s; 33; 33s; 50d; 4/66d | | | | | |
| 2MB | 500987-001 | $72 | 4MB | 500987-002 | $159 |
| Premium 386/25; 33; 33T, Premium II 386SX/16; 20; 25 | | | | | |
| 1MB | 500780-003, 002 | $47 | | | |
| Advantage! 486/25; 33; 33p; SX20, Brava 4/33; 486/25; Premium 4/25; 33TE, Server SE 4/33 | | | | | |
| 2MB | 500718-004, 780-005 | $69 | | | |
| Advantage! 486/25; 33; 33p; SX20, Power Premium 3/33, 4/33; 33s; 50d; 66d, Premium 386/33TE, 486/25; E; 25TE; 33; 33E; 33TE, Premium II 386/25; 33, 486/33, 486SX/20 Premium Server SE 4/33 | | | | | |
| 4MB | 500780-004 | $179 | 8MB | 500780-001 | $358 |

### Compaq

| | | | | | |
|---|---|---|---|---|---|
| ProLinea 3/25s; 3/25zs | | | | | |
| 2MB | 141738-001 | $89 | 8MB | 141742-001 | $319 |
| NEW ProLinea 4/25s, 4/33, 4/50 | | | | | |
| 1MB | 141682-001 | $39 | 2MB | 141683-001 | $85 |
| 4MB | 141684-001 | $181 | 8MB | 141685-001 | $354 |
| DeskPro 386-20, 20e, 25 | | | | | |
| 4MB | 113132-001 | $180 | 4MB | 113645-001 | $244 |
| DeskPro 386s/16 | | | | | |
| 4MB | 112534-001 | $180 | 4MB | 113634-001 | $255 |
| NEW DeskPro 3/25i; 33i,4/25iS; 33i; 66i, 286N; 386N; 386SX/20; 20N, SystemPro LT Series, Portable 486c, M Series | | | | | |
| 2MB | 118689-001 | $85 | | | |
| 4MB | 118690-001 | $181 | 8MB | 112877-001 | $354 |
| ProSignia PC Server 486/33; DX2/66 | | | | | |
| 16MB | 149320-001 | $649 | | | |
| DeskPro 386-33, 486-33, SystemPro | | | | | |
| 2MB | 115144 001 | $99 | 8MB | 116561-001 | $379 |

### Dell

| | | | | | |
|---|---|---|---|---|---|
| Power Desktop 325D; P, 333D, 333P, 433P, 486P, 486D | | | | | |
| 4MB | 310 2507 | $181 | | | |
| PowerLine Workstation 420; 425; 433; 450; 450DE/2, 466DE | | | | | |
| 2MB | 310-2466 | $85 | 8MB | 310-2468 | $362 |
| NEW PowerLine Workstation 420; 425; 433; 450; 450SE/2, 466SE | | | | | |
| 32MB Kit | 310-2630 | $1280 | | | |
| Performance T, L, & M series | | | | | |
| 4MB | 310-3315 | $181 | 16MB | 310-3317 | $640 |

### Hewlett-Packard

| | | | | | |
|---|---|---|---|---|---|
| Vectra QS/16S; 20PC, RS/20; 20C; 25, 25C | | | | | |
| 4MB Kit | 01542 or 1642A | $189 | | | |
| Vectra 386/16N, 386/20N, 386/25N PC | | | | | |
| 2MB | 02406A | $92 | 8MB | 02404A | $310 |
| Vectra 486PC; 25T; 33T; 486s/20; 4/25N; 33H; 50N; 66N | | | | | |
| 2MB | 02381A | $85 | 8MB | 02152A | $354 |
| Vectra 386/25; 486/25U; 486/33U; 486/50U; 486/66U | | | | | |
| 2MB | 02381A | $85 | 8MB | 02152A | $354 |
| Vectra 386/33N; 33NI | | | | | |
| 2MB | 02714A | $92 | 8MB | 02715A | $310 |

### IBM

| | | | | | |
|---|---|---|---|---|---|
| NEW AMBRA Enterprise 386, Hurdle 386, Sprinta 386 (all models) | | | | | |
| 2MB | N/A | $94 | 8MB | N/A | $329 |
| NEW AMBRA Enterprise 486, Hurdle 486, Sprinta 486 (all models) | | | | | |
| 4MB | N/A | $195 | 16MB | N/A | $659 |

| | | |
|---|---|---|
| PS/1 286, 386SX | | |
| 2MB | 92F9935 | $82 |
| 4MB | 92F9694 | $168 |
| PS/1 Consultant, Essential, Expert models x43, x44, PS/Valuepoint all models except Cxx series | | |
| 4MB | 96F9290 | $199 |
| PS/1 Consultant, Essential, Expert models x76 | | |
| 16MB Kit | 96F9291 | $700 |
| PS/2 25/286, 30/286, memory adapter 1497259 | | |
| 2MB Kit | 30F5360 | $81 |
| PS/2 35SX; LS, 40SX, 50Z, 55SX; LS, 65SX; LS, 70, XStation | | |
| 2MB | 6450604 | $85 |
| PS/2 70-A21; A61; B21; B61, PS/1 Consultant, Essential, Expert models x11, x13, x14, PS/Valuepoint Cxx series | | |
| 2MB | 6450608 | $85 |
| PS/2 35SX; LS, 40SX, 55SX; LS, 65SX; LS, XStation, PS/Valuepoint Cxx series, adapter board 34F3011 or 34F3077 | | |
| 4MB | 34F2933 or 87F9977 | $181 |
| PS/2 35SX; LS, 40SX, PS/Valuepoint Cxx series | | |
| 8MB | 6450129 | $354 |
| PS/2 90 XP, 95 XP, P75 (pairs), 56, 57 (all), PS/1 Pro M2123 | | |
| 2MB | 6450902 | $85 |
| PS/2 90 XP, 95 XP, P75 (pairs), 56, 57 (all), PS/1 Consultant, Essential, Expert models x11, x13, x14, PS/1 Pro M2123 | | |
| 4MB | 6450128 | $181 |
| 8MB | 6450130 | $354 |
| Expansion boards for 50, 50Z, 55SX, 60, 65SX | | |
| 2-8MB w/2MB | 1497259 | $199 |

### NEC

| | | |
|---|---|---|
| NEW Image 425, 433, 466 | | |
| 4MB | 410-12002 | $181 |
| 16MB | 410-12003 | $647 |
| Ready 425, 433 | | |
| 4MB | N/A | $195 |
| 16MB | N/A | $649 |
| PowerMate 286/12; SX/16, SX/20 | | |
| 2MB Kit | OP-410-8103 | $96 |
| PowerMate SX/20 | | |
| 2MB CPU Upgrade | OP-410-8101 | $159 |
| 2MB Exp. Board | OP-410-8102+8103 | $180 |

### Zenith

| | | |
|---|---|---|
| Z-Server 425SE, 433DE, 450DE | | |
| 4MB | ME 432 | $152 |
| 8MB | ME 102 | $362 |
| Zenith Z-386/20; 25; 33, 33E | | |
| 1MB | ZA3800ME | $39 |
| 4MB | ZA3800MK | $181 |
| Zenith Z-386SX/20, 286LP+, Z-LS | | |
| 2MB Kit | Z-605-1 | $92 |

## LASER MEMORY

| | | | | | |
|---|---|---|---|---|---|
| Canon LBP-4, 4Lite, 4Plus | | | | | |
| 1MB | S63-2230 | $106 | 2MB | N/A | $145 |
| Epson EPL 6000 | | | | | |
| 2MB | 185401 | $120 | 4MB | N/A | $198 |
| Epson ActionLaser II, EPL-8000 | | | | | |
| 2MB | N/A | $135 | 4MB | N/A | $213 |
| NEW HP LaserJet IIIsi, 4, 4M, 4Si, 4SiMX, XL300, InkJet 600 | | | | | |
| 4MB | C2065A | $181 | 8MB | C2066A | $354 |
| HP LaserJet IIP, III, IIIP, IIID | | | | | |
| 2MB | 33475B | $97 | 4MB | 33477B | $179 |
| HP LaserJet II & IID | | | | | |
| 2MB | 33444B | $110 | 4MB | 33445B | $195 |
| IBM Laser 4029 all models | | | | | |
| 2MB | 1183334 | $96 | 4MB | 1183335 | $157 |
| OkiLaser 400 | | | | | |
| 1MB | 70014701 | $67 | 2MB | N/A | $106 |
| Panasonic 4410 & 4430 | | | | | |
| 2MB | KX P444 | $126 | 4MB | N/A | $191 |
| Panasonic 4450I & 4420 | | | | | |
| 2MB | KX-P441 | $129 | 4MB | N/A | $189 |
| Texas Instruments Microlaser and XL | | | | | |
| 1MB | 2555739-0001 | $46 | 4MB | 2560052-0002 | $99 |

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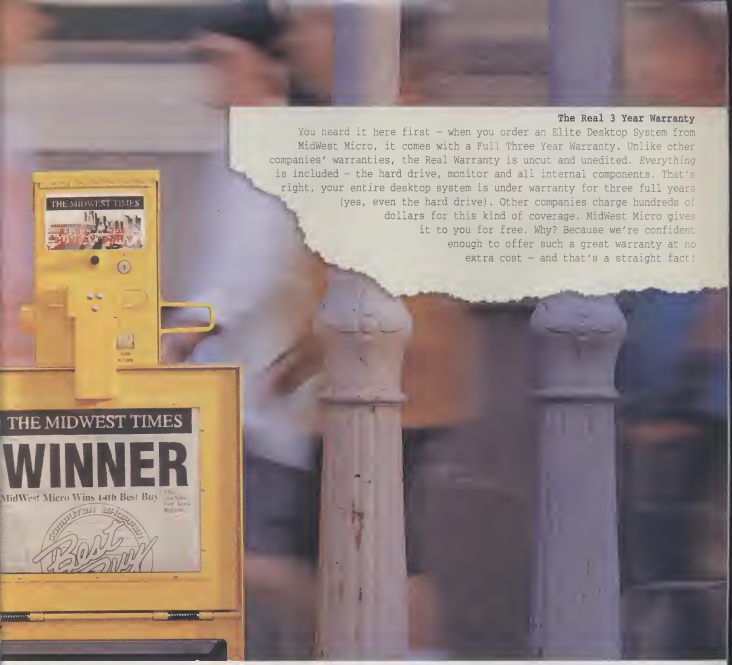



## FRONT PAGE NEWS

MidWest Micro tops the news with the Real Three Year Warranty that covers the monitor, hard drive and all internal components – but we don't want to offset all the other services our customers enjoy, like a **30-Day Money Back Guarantee, Immediate Parts Replacement Policy, Lifetime Toll-Free Technical Support and an On-Line Bulletin Board Service**. No matter how the other companies word it, they just don't deliver service and support like this.

Great products, a well-informed sales team and unbeatable prices — it's no wonder MidWest Micro has earned 14 Computer Shopper Best Buy Awards (chosen by Shopper readers) and PC Computing's Five-Star Rating for outstanding service and support. (Check out the article in *The MidWest Times!*) MidWest Micro has been on a winning streak since 1989, and we don't plan on slowing down anytime soon. We're not the only ones winning, though. With affordable technology and friendly service, when you buy from MidWest Micro, you win, too.

**Circle 272 on reader service card.**

**MidWest Micro**

**1-800-682-7248**

# News Never Traveled So Fast!

*"Did you say clock-tripling speeds?"*
*"I heard the Three-Year Warranty is for real!"*
*"Martha told me that buying an Elite System was the smartest thing she's ever done."*
*"Well, Albert and I just ordered an Elite for our grandson."*

## What's All The Gossip About?

Did you hear about Elite PCI and Pentium™ Systems from MidWest Micro? It's certainly no rumor that Intel's® Pentium processor operates twice as fast as a DX2-66 processor. Plus, superscalar architecture lets it execute two instructions at the same time, dramatically speeding up operation. For such high performance, the price of Elite Systems is very trim.

## Pssst...Pass It On

Superior compatibility, automatic configuration and high-speed data handling are making PCI (Peripheral Component Interconnect) Local Bus the talk of the town. Since these systems are self-configuring, adding network cards, video cards and other peripherals has never been easier. (Just ask Martha!)

intel inside pentium

Seagate

WINDOWS FOR WORKGROUPS

Another highlight of PCI Technology is great video performance. It gives you up to 16.7 million colors (that won't wash out after you shampoo) and 1280 x 1024 resolution. And with refresh rates up to 90 Hz, screens redraw faster than you can say split ends!

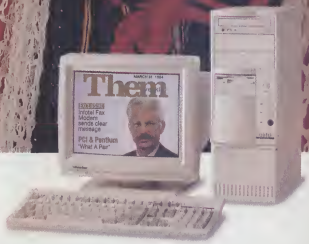
## What Else Is New?

What's new? Elite's new line of Pentium Systems travel at an amazing 90 MHz processing speed, one of the fastest speeds available. Known as P5-90s, these Elites also run cooler and draw significantly less power. If you want to make some permanent waves, order an Elite P5-90 Pentium System from MidWest Micro.

## Wait, There's More...

The curling iron isn't all that's hot – so are Elite DX4 VESA Systems! We're talking processing speeds up to 75 and 100 MHz! News hasn't traveled this fast since the grapevine was invented! Plus, with a powerful VESA Local Bus, you get increased throughput and high-speed video.

MidWest Micro's Intel-based Systems give you more than high speed and excellent performance. They also come with large hard drives and MS-DOS 6.2® and WFW™ 3.11 installed. Some configurations even include a double speed multimedia CD-ROM drive and an internal send and receive fax modem! Call the company that everybody's talking about – call MidWest Micro today.




*Pentium technology is a lot more than just small talk. It can execute two instructions at once, produce processing speeds up to 90 MHz and make everyday applications run even better. Pentium processors also provide the power needed for new multimedia applications and desktop video conferencing.*

*And if clock-tripling VESA performance dominates your conversations, you need an Elite DX4 VESA System. With a powerful VESA Local Bus, fast processing speed and double-speed CD-ROM drive, this System never makes you wait! If you'd like to talk more about Elite DX4 and Pentium Systems, call one of the friendly sales representatives at MidWest Micro – they love to talk, too!*

**MidWest Micro**

**1-800-682-7248**

AD#M601

**Circle 237 on reader service card.**

"At the top of the heap is the MidWest Micro Elite…which certainly lives up to its name. Its crisp double-scan display is well complemented by its enhanced, high performance chip, intelligent design and quality assembly. When you add to that its impressive battery life and toll-free support, at a very reasonable price, the Elite is the class of this field."

**Computer Shopper, May 1994**

# THE ELITE SOUNDBOOK STEALS THE SPOTLIGHT

## This Notebook's Got Something To Say

There's simply no better way to get the word out than with the Elite SoundBook from MidWest Micro. Featuring built-in audio capabilities and the processor, hard drive and screen of choice, the Elite SoundBook is always attracting attention (even when it's not supposed to)!

## It Can't Keep Quiet!

It's hard for the SoundBook to keep quiet since it comes with a built-in microphone and speaker, external jacks and bundled audio software. The software lets you easily record, compress, store and playback voices, sounds or music. Plus, the Elite features a PCMCIA Type III slot so you can add modems, flash memory, network adapters, and more.

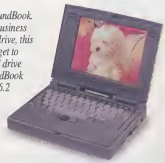
## Attracting Attention From Every Angle

The SoundBook also attracts attention with its visual performance. Available in monochrome, dual-scan color and active-matrix color, these screens make presentations look great.

## A Keynote Speaker

Even when it's part of the audience, the Elite SoundBook steals the spotlight. Business presentations have never looked or sounded so good! And it comes in a variety of configurations, so you can pick the one that best suits your needs. You can even select a processor with a clock-tripling 100 MHz processing speed! With its long battery life, up to 520 Mb hard drive and local bus video with 1 Mb video DRAM, this lightweight notebook really makes a statement. Invite the Elite SoundBook to your next press conference. It won't just be the topic of discussion—it'll be the main speaker!

*The media can't stay away from the Elite SoundBook. With 4 Mb of RAM (expandable to 20 Mb), business audio features and a user replaceable hard drive, this notebook is hot news! And the fact that you get to choose your own processor, screen and hard drive has really got reporters interested. The SoundBook even comes with Lotus Organizer, MS-DOS 6.2 and WFW 3.11 installed. Whether you'd like the color (6.7 lbs.) or monochrome (6.2 lbs.) version, the Elite SoundBook steals the show.*



***News On a Lighter Note***

*Ready for more good news? The Elite 486SX-33 SubNote weighs only 3.9 lbs. and comes with a dual-scan color or monochrome screen. With its high-speed RAM and fast processor, this SubNote really beats the press! If you like the lighter side of news, you're going to love the Elite 486SX-33 SubNote.*

**MidWest Micro**

**1-800-682-7248**

**Circle 271 on reader service card.**

AD#M602

# PENTIUM PCI SYSTEMS

## P5-60 $2299

#007830
- Intel® 60 MHz Pentium™ Processor
- 8 Mb RAM, 256 Kb Cache
- 340 Mb IDE Hard Drive
- PCI Fast IDE Interface
- PCI Local Bus Graphics
- 3.5" Disk Drive
- 15" SVGA .28 N/I Multi-Scan Color Monitor with Hitachi CRT
- 8-Bay Middle-Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- 101-Key Enhanced Keyboard
- High-Resolution Mouse
- MS-DOS® 6.2 and WFW™ 3.11

## P5-66 $2699

#007831
- Intel 66 MHz Pentium Processor
- 8 Mb RAM, 256 Kb Cache
- 528 Mb IDE Hard Drive
- PCI Fast IDE Interface
- PCI Local Bus Graphics with 2 Mb
- Double Speed CD-ROM Drive
- Internal 14.4 S/R Fax Modem
- 3.5" Disk Drive
- 15" SVGA .28 N/I Multi-Scan Color Monitor with Hitachi CRT
- 8-Bay Middle-Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- 101-Key Enhanced Keyboard
- High-Resolution Mouse
- MS-DOS 6.2 and WFW 3.11

## P5-66 $3199

#007833
- Intel 66 MHz Pentium Processor
- 16 Mb RAM, 256 Kb Cache
- 528 Mb IDE Hard Drive
- PCI Fast IDE Interface
- Intel PCI Local Bus Graphics with 2 Mb
- Double Speed CD-ROM Drive
- Microsoft 3 Disk CD-ROM Software Library – Encarta, Works & Money
- Pro Audio 16 Sound Card
- Digital Quality, Compact Speakers
- Internal 14.4 S/R Fax Modem
- 3.5" Disk Drive
- 15" SVGA .28 N/I Multi-Scan Color Monitor with Hitachi CRT
- 8-Bay Middle-Tower Case
- 3 ISA, 2 PCI & 1 PCI/ISA Slots
- 101-Key Enhanced Keyboard
- High-Resolution Mouse
- MS-DOS 6.2 and WFW 3.11

## P5-90 $3499

#007834
- Intel 90 MHz Pentium Processor
- 16 Mb RAM, 256 Kb Cache
- 528 Mb IDE Hard Drive
- PCI Fast IDE Interface
- Intel PCI Local Bus Graphics with 2 Mb
- Double Speed CD-ROM Drive
- Internal 14.4 S/R Fax Modem
- 3.5" Disk Drive
- 17" SVGA .26 N/I Color Monitor with Hitachi CRT
- 10-Bay Full-Tower Case
- 3 ISA, 2 PCI & 1 PCI/ISA Slots
- 101-Key Enhanced Keyboard
- High-Resolution Mouse
- MS-DOS 6.2 and WFW 3.11

## P5-66 $2999

#007832
With 1 Gb SCSI HDD & Without 14.4 Internal S/R Fax Modem

# VESA AND PCI SYSTEMS

## 486SX-33 $1199

#006674
- Intel 486SX-33 Processor
- 4 Mb RAM, 128 Kb Cache
- 340 Mb IDE Hard Drive
- 32-Bit VESA Local Bus Graphics with 1 Mb
- 32-Bit VESA Local Bus IDE
- 3.5" and 5.25" Disk Drives
- 14" SVGA .28 N/I Color Monitor with Hitachi CRT
- 8-Bay Mini-Tower Case
- 5 ISA & 3 VESA/ISA Slots
- 101-Key Enhanced Keyboard
- High-Resolution Mouse
- MS-DOS 6.2 and WFW 3.11

## 486DX-33 $1379

#006675

## 486DX2-50 $1399

#006676

## 486DX2-66 $1799

#006677
- Intel 486DX2-66 Processor
- 8 Mb RAM, 128 Kb Cache
- 340 Mb IDE Hard Drive
- 32-Bit VESA Local Bus Graphics with 1 Mb
- 32-Bit VESA Local Bus IDE
- Double Speed CD-ROM Drive
- 3.5" Disk Drive
- 15" SVGA .28 N/I Multi-Scan Color Monitor with Hitachi CRT
- 8-Bay Mini-Tower Case
- 5 ISA & 3 VESA/ISA Slots
- 101-Key Enhanced Keyboard
- High-Resolution Mouse
- MS-DOS 6.2 and WFW 3.11

## 486DX-33 $1679

#007808

## 486DX2-50 $1699

#007809

## DX4-75 $2399

#007826
- Intel DX4-75 Processor
- 16 Mb RAM, 128 Kb Cache
- 428 Mb IDE Hard Drive
- 32-Bit VESA Local Bus Graphics with 2 Mb
- 32-Bit VESA Local Bus IDE
- Double Speed CD-ROM Drive
- 3.5" Disk Drive
- 15" SVGA .28 N/I Multi-Scan Color Monitor with Hitachi CRT
- 8-Bay Mini-Tower Case
- 5 ISA & 3 VESA/ISA Slots
- 101-Key Enhanced Keyboard
- High-Resolution Mouse
- MS-DOS 6.2 and WFW 3.11

## 486DX2-66 $2299

#007827

## DX4-100 $2499

#007828

## DX4-100 PCI $2999

#007829
- Intel DX4-100 Processor
- 16 Mb RAM, 128 Kb Cache
- 528 Mb IDE Hard Drive
- 32-Bit VESA Local Bus Graphics with 2 Mb
- Double Speed CD-ROM Drive
- 3.5" Disk Drive
- 17" SVGA .26 N/I Color Monitor with Hitachi CRT
- 8-Bay Middle-Tower Case
- 3 ISA, 2 PCI & 1 PCI/ISA Slots
- 101-Key Enhanced Keyboard
- High-Resolution Mouse
- MS-DOS 6.2 and WFW 3.11

# SLIMLINE VALUE SYSTEMS

## HOME PC 486DX2-50 $1799

#007824
- Intel® 486DX2-50 Processor
- 4 Mb RAM, 128 Kb Cache
- 250 Mb IDE Hard Drive
- 32-Bit Local Bus Graphics with 1 Mb
- 32-Bit Local Bus IDE
- Double Speed CD-ROM Drive
- Microsoft 3 Disk CD-ROM Software Library – Encarta™, Works™ & Money™
- Pro Audio 16 Sound Card
- Digital Quality, Compact Speakers
- 9624 Internal S/R Fax Modem
- 3.5" Disk Drive
- 15" SVGA .28 N/I Multi-Scan Color Monitor with Hitachi CRT
- Slimline Case
- 4 ISA & 1 VESA/ISA Slots
- 101-Key Enhanced Keyboard
- High-Resolution Mouse
- MS-DOS 6.2 and WFW 3.11

## 486DX2-66 $1899

#007825

# SERVICES

Every MidWest Micro Elite is backed by:
- Three-Year "Real Warranty" on desktops
- One-Year Warranty on portables
- 30-Day Money Back Guarantee
- Immediate Parts Replacement Policy
- Lifetime Toll-Free Technical Support
- On-Line Bulletin Board Service

## MONITOR UPGRADE

*Ask your sales representative how you can upgrade your monitor to a 15" or 17" Elite monitor.*

**14" to 15" $89**
**14" to 17" $419**
**15" to 17" $319**

# ELITE NOTEBOOKS

## ELITE SoundBook

- Intel® 486, DX2 or DX4 Processor
- 4 Mb RAM (expands to 20 Mb)
- 9.5" Mono, 10.3" Dual-Scan or 9.5" Active Matrix VGA Display
- Local Bus Video with 1 Mb Video DRAM
- Business Audio Features Including: Built-in Microphone & Speaker External Jacks for Line In & Line Out
- 3.5" Built-in Disk Drive
- User Replaceable Hard Drive
- Two Type II/One Type III PCMCIA Slot
- Built-in Trackball
- NiMH Battery & AC Adapter
- Advanced Power Management with SMI
- One Parallel & One Serial Port
- External VGA & Keyboard Port
- MS-DOS™ 6.2 & WFW™ 3.11
- Lotus Organizer™
- Weight: Mono – 6.2 lbs. Color – 6.7 lbs.
- Carrying Case

### Dual Scan Color SoundBook

**486SX-33 with 260 Mb HDD**
#007328 **$1999**

**486DX-33 with 260 Mb HDD**
#007329 **$2199**

**DX2-50 with 340 Mb HDD**
#007330 **$2299**

**DX2-66 with 520 Mb HDD**
#007331 **$2499**

**DX4-75 with 340 Mb HDD & 8 Mb of RAM**
#007332 **$2799**

**DX4-100 with 520 Mb HDD & 8 Mb of RAM**
#007333 **$2999**

### Monochrome SoundBook

**486SX-33 with 260 Mb HDD**
#007334 **$1499**

**486DX-33 with 260 Mb HDD**
#007335 **$1699**

**DX2-50 with 340 Mb HDD**
#007336 **$1799**

### Active Matrix SoundBook

**DX2-66 with 340 Mb HDD & 8 Mb of RAM**
#007337 **$3499**

**DX4-75 with 520 Mb HDD & 8 Mb of RAM**
#007338 **$3799**

**DX4-100 with 520 Mb HDD, 8 Mb of RAM & PCMCIA 9624 S/R Fax Modem**
#007339 **$3999**

### Options

| | | |
|---|---|---|
| 4 Mb RAM Card | #005976 | $219 |
| 8 Mb RAM Card | #005977 | $469 |
| 16 Mb RAM Card | #005978 | CALL |
| Car Adapter | #005979 | $ 59 |
| PCMCIA 9624 Fax Modem | #001722 | $149 |
| PCMCIA 14.4 Fax Modem | #001812 | $229 |
| PCMCIA Ethernet Adapter | #001832 | $159 |

* Ask your MidWest Micro sales representative about additional hard drive, screen and processor options.

## Elite 486SX SubNote

- Intel 486SX SL-Enhanced Processor
- 4 Mb RAM (expands to 12 Mb)
- 9.5" Mono or Dual-Scan VGA Display
- Turbo Bus Accelerated Video
- 3.5" External Disk Drive
- User Replaceable Hard Drive
- One Type II PCMCIA Slot
- Built-in Trackball
- NiMH Battery & AC Adapter
- Advanced Power Management with SMM
- One Parallel & One Serial Port
- External VGA & Keyboard Port
- MS-DOS 6.2
- Weight: 3.9 lbs.
- Carrying Case

### Monochrome SubNote

**486SX-25 with 260 Mb HDD**
#007342 **$1299**

**486SX-25 with 340 Mb HDD & PCMCIA 9624 S/R Fax Modem**
#007307 **$1499**

### Dual Scan Color SubNote

**486SX-33 with 260 Mb HDD & WFW 3.11**
#007340 **$1899**

**486SX-33 with 340 Mb HDD & WFW 3.11**
#007341 **$1999**

### Options

| | | | | | |
|---|---|---|---|---|---|
| 4 Mb RAM Card | #005970 | $219 | PCMCIA 9624 Fax Modem | #001722 | $149 |
| 8 Mb RAM Card | #005971 | $469 | PCMCIA 14.4 Fax Modem | #001812 | $229 |
| Car Adapter | #005972 | $ 65 | PCMCIA Ethernet Adapter | #001832 | $159 |

EPA POLLUTION PREVENTER

Seagate

WINDOWS FOR WORKGROUPS

3 YEAR


**MidWest Micro**
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1-800-262-6622
Customer Service:
1-800-728-8584
Dealers Call:
1-800-682-4711


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**Circle 273 on reader service card.**

AD#M603

Winner of 8 Best Buys including "Best Overall Peripheral Supplier" Computer Shopper Jan. 1994

Best Buy

# USA Flex... Name

## TEXAS INSTRUMENTS

*TravelMate 4000 and TravelMate 4000E Series*

Starting At...

**$1699**

TravelMate 4000E WinSX/25 ..... $1699
TravelMate 4000 WinDX/25 120MB/200MB ..... $1999/$2179
TravelMate 4000E WinDX/50 200MB ..... $2429

TravelMate 4000E WinSX/25 Adv. Pass. Color 120MB ..... $1849
TravelMate 4000 WinDX2/40 Color 200MB ..... $2439
TravelMate 4000E WinDX2/50 Dual Scan Color 200MB ..... $2789
TravelMate 4000E WinDX2/50 Active Matrix Color 200MB ..... $3379
TravelMate 4000E WinDX4/75 Active Matrix Color 340MB/459MB ..... $4449/$4949
TravelMate DeskTop Intelligent Docking System ..... $799

*Introducing the NEW TM4000M Notebook Series*

As Low As...

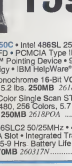
NEW **$2029**

- 4MB RAM • 3.5" FD
- Ext. NI Monitor Support: 1024x768/256 Colors
- 1 Type III PCMCIA Card Slot• MIDI I/F • 16-bit Sound Card
- NiMH Battery (3-4 hrs.) • Int. Pointing Device, Speaker & Microphone • MS-DOS 6.2, Windows for Workgroup, Adaptec-SCSI, PCMCIA Card & Socket Services

TM4000 M Mono 486 SL Enhanced SX/25 MHz, 9.5" Display, 120MB HD, 6.1 lbs. *979334-0001* ..... $2029
TM4000 M Active Matrix Color 486 SL Enhanced SX/25 MHz, 8.4" Display, 200MB HD, 6.4 lbs. *979333-0001* ..... $3199
TM4000 M Advanced Passive Color 486 SL Enhanced SX/25 MHz, 8.2" Display, 120MB HD, 6.4 lbs. *979332-0001* ..... $2369
TM4000 M Active Matrix Color 486 DX4/75 MHz, 8.4" Display, 344MB HD 6.4 lbs. *979461-0001* ..... $4979

## IBM *ThinkPad®* 350, 350C & 500 Notebooks

Starting At...



**$1599**

ENERGY STAR COMPLIANT

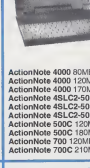
**ThinkPad 350 & 350C** • Intel 486SL 25MHz • 8K Cache • 4MB RAM • 3.5" FD • PCMCIA Type II Slot • TRACKPOINT II™ Pointing Device • 9 Hrs battery life • DOS 5.02 • Prodigy • Help/Wave® • 1 yr. carry-in Warr.

**Model 350** 9.5" Monochrome 16-Bit VGA, 640 x 480, 64 shades of gray, 5.2 lbs. **250MB** *26F/40A* ..... $2099
**Model 350C** 9.2" Color Single Scan STL Backlit LCD, 16-Bit VGA, 640 x 480, 256 Colors, 5.7 lbs. **125MB** *26J/60A* / **250MB** *26J/60A* ..... $1999/$2399

**ThinkPad 500** • 486SLC2 50/25MHz • 4MB RAM • 1 Type II PCMCIA Slot • Integrated TrackPoint II™ pointing device • 3.5-9 Hrs. Battery Life
**85MB** *26F/68N* / **170MB** *26G/17N* ..... $1599/$1899

## EPSON ActionNote™

Starting At...



**$1299**

ActionNote 4000 80MB ..... $1299
ActionNote 4000 120MB ..... $1349
ActionNote 4000 170MB ..... $1399
ActionNote 4SLC2-50 120MB W/Modem ..... $1499
ActionNote 4SLC2-50 180MB ..... $1499
ActionNote 4SLC2-50 180MB W/Modem ..... $1599
ActionNote 500C 120MB W/Modem ..... $1979
ActionNote 500C 180MB W/Modem ..... $2069
ActionNote 700 120MB/210MB ..... $1899/$1999
ActionNote 700C 210MB/700Cx 210MB ..... $2569/$3229

## TOSHIBA *Portege T3400CT*

NEW

Only...

**$3399**

- 486SX/33.3.3V
- Active Matrix
- 4.1 pounds
- 120MB Hard Drive
- 4 MB RAM (Max. 20MB).

All Toshiba Notebooks include 3.5" 1.44MB FDD, at least one PCMCIA Slot, DOS 6.0 and Windows 3.1

T1910/T1910CS 200MB ..... $1579/$2099
T1950CS 200 MB ..... $2449
T1950CT 200 MB/320MB ..... $2779/$3049
T3400/T3400CT 120MB ..... $1999/$3399
T4700CS 200MB/320MB ..... $3399/$3739
T4700CT 200MB/320MB ..... $4579/$4929
T4800CT 500MB ..... $5599
T6600C, C/CD ..... $6199/$6699

## NEC VERSA™ 50EC

NEW in USA FLEX!

**$4799**

- ✓ SL Enhanced 486DX2-50
- ✓ 340MB Hard Drive
- ✓ 4MB RAM
- ✓ 9.5" Active Matrix Color
- ✓ 6.9 lbs.
- ✓ PCMCIA (2 Type II or 1 Type III)

VERSA 40EC SL486DX2-40 120MB/250MB ..... $3749/$4149
VERSA 50EC SL486DX2-50 209MB/340MB ..... $4429/$4799

## PRINTERS

### EPSON

**LASER PRINTERS**

ACTION LASER 1500 ..... $649
ACTION LASER 1600 ..... CALL

**DOT MATRIX PRINTERS**

AP 2250 ..... $124 | LQ-670 ..... $439
LX300 ..... $164 | LQ-1170 ..... $598
AP 3250 ..... $172 | LQ-2550 Clr ..... $899
AP 3260 ..... $194 | DFX-5000+ ..... $1319
LQ-570+ ..... $239 | DFX-8000 ..... $2249
FX-870 ..... $268 | Stylus 300 ..... $229
FX-1170 ..... $349 | Stylus 800 ..... $249*
LQ-1070+ ..... $364

*After $5 Mail in Rebate. Ends 5/30/94.

### PANASONIC

**LASER PRINTERS**

KX-P4410 ..... $529 | KX-P5400 ..... $799
KX-P4400 ..... $469 | KX-P4440 ..... $999
KX-P4430 ..... $659

**DOT MATRIX PRINTERS**

KX-P1150 ..... $129 | KX-P1624 ..... $369
KX-P2023 ..... $199 | KX-P3123 ..... $249
KX-P2123 ..... $239 | KX-P3124 ..... $319
KX-P2124 ..... $309 | KX-P3624 ..... $399

### CANON

**BUBBLE JET PRINTERS**

BJ-10SX/BJ-200e/BJ-230 ..... $249/$299/$389
BJC-600 ..... $579
LBP-860 ..... $1389

## PRINTERS

### NEC

Silentwriter SuperScript 610 ..... $479
Silentwriter Model 1097 ..... $1379

### TEXAS INSTRUMENTS

microMarc™ ..... $249**
microWriter ..... $99
microWriter PS23/PS65 ..... $679/$939
microLaser Pro 600 PS23/PS65 ..... $1299*/$1469*
Pro 600 imaging cartridge ..... $159
*After $60 mail-in rebate. Ends. 6/30/94.
**After $30 mail-in rebate. Ends. 6/30/94.

### SHARP

JX-9400/JX-9460PS ..... $479/$949
JX-9660PS ..... $1249

## MONITORS

### NEC

14" SVGA ..... $309 | 17" SFGe ..... $999
15" 3V ..... $469 | 17" SFGp ..... $1099
15" 3FGe ..... $559 | 21" 6FGp ..... $1999
15" 4FGe ..... $619

### FLEXVision

14" VGA Mono/1024x768 NI ..... $119/$265
14" 1280x1024 ..... $319

### CTX

14" .39mm ..... $219
14" .28mm Int./ E Star & MPR-II ..... $259/$279
14" .28mm NI/ E Star & MPR-II ..... $275/$299
14" .28mm NI (1462GM) ..... $329
15" .28mm Int./.28mm NI ..... $389/$399
17" .28mm NI ..... $765

## MONITORS (cont.)

### KAG Innovision

14" LX1450LG ..... $299
15" DX15F/MX15F-L ..... $449/$499
17" DX17F/MX17F-L ..... $699/$879
17" MX17FG ..... $929

### SONY

17" CPD-1730E/GDM-17E1 ..... $999/$1179
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### HP DeskJet 520 Printer (NEW)

Laser-quality 600 dpi output, Plain-paper convenience, Prints envelopes and transparencies, 3 pages per minute, Includes 13 scalable typefaces for Windows, 3-Year Warranty

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## 486DX2/66 Multi-Media Hardware Feature Comparison

| Feature | VTech | DELL | Gateway | Zeos |
|---|---|---|---|---|
| Memory | 8MB | 8MB | 8MB | 8MB |
| Hard Drive | 426MB | 450MB | 424MB | 426MB |
| Floppy Drives | 3.5" | 3.5" | 3.5" | 3.5" |
| Video | 1 MB VLB | 1 MB VLB | 1 MB VLB | 1 MB VLB |
| 3 Year warranty* | Yes | No | No | No |
| Double Speed CD-RDM | Yes | Yes | Yes | Yes |
| Sound Card & Speakers | Yes | Yes | Optional ($132) | Optional ($148) |
| Modem | Yes | Optional ($79) | Optional ($49) | Optional ($49) |
| Remote Diagnostics Sftw. | Yes | No | No | No |
| Case | Full Size | Desktop | Baby AT | Desktop |
| External Cache | 128K | 128K | 128K | No |
| Monitor | 15" | 15" | 15" | Upgrade ($95) |
| PC Computing Service Value Rating (Aug. 1993) | ★★★★★ | ★★★★ | ★★★★ | ★★★★ |
| Price* | $2099 | $3074 | $2476 | $2762 |

The VTech Multi-Media systems are available with VTech's integrated local bus or with our new VESA local bus. All VTech desktop and tower systems come complete with VTech's 3 year warranty. *Contact your sales professional for details.

## Multi-Media Systems You Can See and Hear

**In 1993 Computer Shopper singled out VTech as one of the fastest growing companies in the PC industry. The reason is simple, we are the manufacturer - not an assembler of someone else's components - which means we can truly deliver- "Technology at Prices You Can Afford."**

- VTech designs and manufactures our own components so we control the quality, features and performance.
- With over 11,000 employees and 3 research and engineering labs VTech has the technology and resources to build incredible systems.
- Our prices are among the lowest in the industry because we supply systems to some of the largest manufacturers in the world and that helps us keep production high and prices low.
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## expotech series

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- 16-Bit Stereo Sound Board
- VLB Graphics with 1MB
- 3.5" Diskette Drive
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- Dual Cooling Fans
- MS-DOS 6.2 & Windows 3.1
- Enhanced 101 - Keyboard & Mouse
- 3 Year Warranty*

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- 424MB 13ms IDE Hard Drive
- Double Speed CD-ROM
- 16-Bit Stereo Sound Board
- VLB Graphics with 1MB
- 3.5" Diskette Drive
- 15" VTech HiRez Monitor
- Dual Cooling Fans
- MS-DOS 6.2 & Windows 3.1
- Enhanced 101 - Keyboard & Mouse
- 3 Year Warranty*

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### Expo 486DX2/66VM

- **Intel Verified:** for the Pentium™ OverDrive™ Processor
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- 527MB 12ms IDE Hard Drive
- Double Speed CD-ROM
- 16-Bit Stereo Sound Board
- VLB Graphics with 1MB
- 3.5" Diskette Drive
- 15" VTech HiRez Monitor
- Dual Cooling Fans
- MS-DOS 6.2 & Windows 3.1
- Enhanced 101 - Keyboard & Mouse
- 3 Year Warranty*

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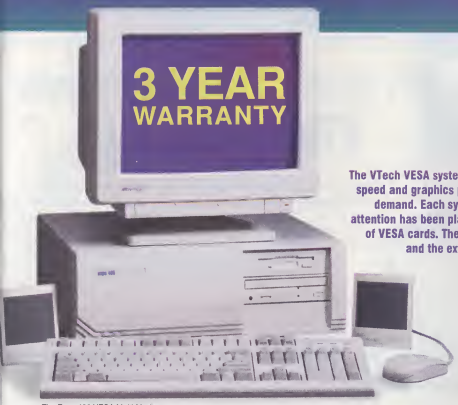


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- VLB Graphics with 1MB
- 3.5" Diskette Drive
- 15" VTech HiRez Monitor
- Dual Cooling Fans
- MS-DOS 6.2 & Windows 3.1
- Enhanced 101 - Keyboard & Mouse
- 3 Year Warranty*

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- 15" VTech HiRez Monitor
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- Enhanced 101 - Keyboard & Mouse
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- 424MB 13ms IDE Hard Drive
- 256KB Copy Back Cache
- SCSI II w/ built-in BIOS support
- 16550 Serial Port Controllers
- Multiprocessor Upgrade Slot
- S3 VLB Accelerator with 1MB
- 3.5" Diskette Drive
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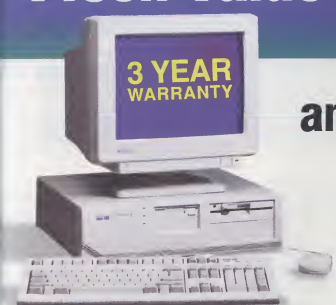


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- 3.5" Diskette Drive
- 14" VTech HiRez Monitor
- Full Size Metal Desktop Case
- MS-DOS 6.2 & Windows 3.1
- Enhanced 101 -Keyboard & Mouse
- 3 Year Warranty*

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- Pentium™ Technology Ready
- 4MB RAM with 128KB Cache
- 424MB 13ms IDE Hard Drive
- Local Bus Graphics with 1MB
- 3.5" Diskette Drive
- 14" VTech HiRez Monitor
- Full Size Metal Desktop Case
- MS-DOS 6.2 & Windows 3.1
- Enhanced 101 -Keyboard & Mouse
- 3 Year Warranty*

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- Pentium™ Technology Ready
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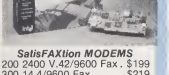

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PC MAGAZINE EDITORS' CHOICE
December 7, 1993
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  - Enhanced 101-key Keyboard
  - Hi-Resolution 400 DPI Serial Mouse
- Anti-Virus MS-DOS 6.2 & Windows 3.11
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|---|---|
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  - **8MB** RAM & **128K** Cache SRAM
  - One Floppy Drive (3.5" or 5.25")
  - VESA Local Bus IDE Hard Disk Controller
  - **425MB** 12ms IDE Drive with 128K Cache
- 32-Bit VL-Bus **ThunderPro (1MB)** Graphics Accelerator (Up to 1280x1024 & up to 16.7 million Colors) **(Up to 38 Million WinMark 3.11)**
- 15" Flat Screen 28mm Non-interlaced Color Monitor **(36% larger edge to edge display)**
  - 2 Serial, 1 Parallel & 1 Game Ports
  - Enhanced 101-key Keyboard
  - Hi-Resolution 400 DPI Serial Mouse
- Anti-Virus MS-DOS 6.2 & Windows 3.11
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| 6450129 (8Meg) | 35SX, 40SX | 339.00 |
| 6450130 (8Meg) | 56, 57, 57SX, 90, 95, P-75, 57SLC Value Point 77 486DX2, 466SX, SVR 85 | 338.00 |

## IBM NOTEBOOK & LAPTOP MEMORY

| | | |
|---|---|---|
| ———— (4Meg) | Thinkpad 500 | 230.00 |
| ———— (8Meg) | Thinkpad 500 | 459.00 |
| 79F0999 (2Meg) | LX40 N33SX, PS Note, Thinkpad 710T | 103.00 |
| 79F1000 (4Meg) | LX40, N33SX, PS Note, Tkpd 350, 350c, 710T, PS Note 425 | 199.00 |
| 79F1001 (8Meg) | LX40, N33SX, PS Note, Thinkpad 710T | 369.00 |
| 07G1826 (2Meg) | N51 (all) | 103.00 |
| 07G1827 (4Meg) | N51 (all) | 199.00 |
| 07G1828 (8Meg) | N51 (all) | 419.00 |
| 07G1414 (2Meg) | Thinkpad 750, 750c | 119.00 |
| 07G1415 (4Meg) | Thinkpad 750, 750c | 199.00 |
| 07G1416 (8Meg) | Thinkpad 750, 750c | 389.00 |
| 68G0084 (16Meg) | Thinkpad 750, 750c | 849.00 |
| 07G1420 (4Meg) | CL57LSX LpTp Thinkpad 700, 700C, 720, 720C | 199.00 |
| 07G1421 (8Meg) | CL57LSX LpTp Thinkpad 700, 700C, 720, 720C | 389.00 |
| 60G0378 (8Meg) | Thinkpad 350, 350c, PS Note 425 | 359.00 |
| 60G0379 (16Meg) | Thinkpad 350, 350c, PS Note 428 | 669.00 |
| 92F8804 (2Meg) | N45SL | 109.00 |

## COMPAQ MEMORY MODULES

| MODEL | AMT. UPGRADED | CMPQ PART # | PRICE |
|---|---|---|---|
| DeskPro 386/33, 386/33L, 486/25, 486/33L, 486/50L, System Pro | 2Meg Module | 115144-001 | 109.00 |
| | 6Meg Module | 116561-001 | 429.00 |
| | 32Meg Module | 116568-001 | 1459.00 |
| DeskPro 386/33L, 486/33L | (Exp Bd) | 116569-001 | 279.00 |
| DeskPro 386/25, 386/20 | 1Meg Module | 113131-001 | 79.00 |
| | 4Meg Module | 113132-001 | 199.00 |
| DeskPro 386S-16MHz | 1Meg Exp Bd | 113633-001 | 149.00 |
| | 4Meg Exp Bd | 113634-001 | 279.00 |
| | 1Meg Module | 113646-001 | 79.00 |
| | 4Meg Module | 112534-001 | 199.00 |
| DeskPro 386/20E, DeskPro 386/25E | 1Meg Exp Bd | 113644-001 | 149.00 |
| | 4Meg Exp Bd | 113645-001 | 279.00 |
| | 1Meg Module | 113131-001 | 79.00 |
| | 4Meg Module | 113132-001 | 219.00 |
| DeskPro 286N, 386N, 386SX/20, 386/25M, 486/33M, 466S/25M, 466S/16M | 1Meg Module | 118686-001 | 50.00 |
| | 2Meg Module | 118669-001 | 89.00 |
| | 4Meg Module | 118690-001 | 169.00 |
| | 8Meg Module | 128877-001 | 389.00 |
| Port I Series 466C | 0-64Meg | 129160-001 | 189.00 |
| M Series Exp Bd | 1Meg Kit | 108071-001 | 99.00 |
| DeskPro 386/16 | 4Meg Kit | 108072-001 | 299.00 |
| | 1-2Meg Exp Bd | 108069-001 | 239.00 |
| | 4-8Meg Exp Bd | 108070-001 | 437.00 |
| DeskPro 286 | 512K Kit | 113012-001 | 49.00 |
| DeskPro 5/60, 5/66M, 5/66M; Prosignia 5/60; Proliant 100 5/60; Proliant 2000 4/30, 5/66; Proliant 4000 4/50, 5/66 — ALL OF THESE MACHINES USE THESE MODULES | 8Meg Kit | 149911-001 | 389.00 |
| | 16Meg Kit | 149949-001 | 707.00 |
| | 32Meg Kit | 149912-001 | 1399.00 |
| | 64Meg Kit | 149913-001 | 2700.00 |
| | 128Meg Kit | 140914-001 | 5900.00 |
| Prolinea 386 3/25S, 3/25ZS | 2Meg | 141738-001 | 109.00 |
| | 8Meg | 141742-001 | 338.00 |
| Prolinea 486 4/25S, 4/33, 4/50, 4/66, CDS | 2Meg | 141683-001 | 95.00 |
| | 4Meg | 141684-001 | 175.00 |
| | 8Meg | 141685-001 | 330.00 |
| Prosignia PC Server, 486/33, 486 DSX/66 | 8Meg | 141685-001 | 339.00 |
| | 16Meg | 149320-001 | 699.00 |
| | 32Meg | 149147-001 | 1525.00 |

## COMPAQ LAPTOPS & NOTEBOOKS

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|---|---|---|---|
| LTE/286 | 2Meg Bd | 117081-002 | 99.00 |
| LTE/286 | 4Meg Bd | 117061-003 | 179.00 |
| LTE/386S/20 | 4Meg Module | 121125-002 | 209.00 |
| LTE LITE/20, 25, 25C | 4Meg Module | 129769-002 | 209.00 |
| LTE LITE/20, 25, 25C | 8Meg Module | 129769-003 | 389.00 |
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| LTE LITE 4/25C, 4/23E, 433C | 4Meg Module | 142337-002 | 179.00 |
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| LTE LITE 4/25C, 4/23E, 433C | 16Meg Module | 142337-004 | 774.00 |
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| SLT/386 | 2Meg Module | 118304-001 | 109.00 |
| SLT/386 | 4Meg Module | 118305-001 | 219.00 |
| Concerto, LTE Elite | 4Meg | 144790-001 | 199.00 |
| | 8Meg | 144790-002 | 399.00 |
| | 16Meg | 144790-003 | 809.00 |
| Contura 320, 325 | 2Meg | 139497-001 | 99.00 |
| | 4Meg | 139498-001 | 179.00 |
| | 8Meg | 139499-001 | 349.00 |
| Contura 4/25, 4/25C, 4/25CX | 4Meg | 146520-001 | 179.00 |
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|---|---|---|---|
| T1000SE/XE/LE | 2Meg | PC14-PA6312U | 94.00 |
| T2000/T2000SX | 2Meg | PC18-PA6317U | 94.00 |
| T2000SX/T1000LE | 4Meg | PC-PA6314U | 189.00 |
| T2000SX/T1000LE | 8Meg | PC14-PA8315U | 359.00 |
| T2000SXE/2200SX/T1800, 1850, C | 2Meg | PC-PA2000U | 94.00 |
| T2000SXE/2200SX/T1800, 1850, C | 4Meg | PC-PA2001U | 189.00 |
| T2000SXE/2200SX/T1800, 1850, C | 8Meg | PC-PA2002U | 359.00 |
| T4400SX, SXC T6400, T6600 | 4Meg | PC-PA2004U | 199.00 |
| T4400SX, SXC T6400, T6600 | 8Meg | PC-PA2005U | 379.00 |
| T4400SX, SXC T6400, T6600 | 16Meg | PC-PA2010U | 699.00 |
| T4500, C T4600 T4700, T1900 C T1910, T1950 (3.3 v) | 4Meg | PC-PA2012U | 209.00 |
| T4500, C T4600 T4700, T1900, C T1910, T1950 (3.3 v) | 8Meg | PC-PA2013U | 419.00 |
| T4500 C, T4600, T4700, T1900 C, T1910, T1950 (3.3 v) | 16Meg | PC-PA2014U | 869.00 |
| T3300SL | 6Meg | PC-PA2008U | 268.00 |
| T3300SL | 16Meg | PC-PA2009U | 899.00 |
| T3400CT | 4Meg | PC-PA2019V | 219.00 |
| | 8Meg | PC-PA2020V | 419.00 |
| | 16Meg | PC-PA2021V | 869.00 |
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| T1600 | 2Meg | PC8-PA8302U | 99.00 |
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| T3100e | 2Meg | PC9-PA8340U | 109.00 |
| T3100SX | 2Meg | PC15-PA6308U | 109.00 |
| T3100SX | 4Meg | PC15-PA8310U | 199.00 |
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| T3200SXC | 2Meg | PC19-PA8318U | 119.00 |
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| T5200/T8500 | 8Meg | PC10-PA8313U | 419.00 |

## NOTEBOOK, LAPTOP MEMORY

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|---|---|---|---|
| ACER 730 | 2Meg/4Meg/8Meg | | 109/209/449 |
| ACER 750 | 4Meg/8Meg/16Meg | | 199/459/869 |
| ALR Ventura | 4Meg | 12407980 | 249.00 |
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| AST Power Exec 3/25C, 425EL | 16Meg | | 619.00 |
| AST Power Exec 425SL | 4Meg | 501166-001 | 199.00 |
| AST Power Exec 425SL | 16Meg | 501166-003 | 819.00 |
| AST Power Exec 4/33SL | 4Meg/16Meg | 501316-001,002 | CALL/CALL |
| AT&T Safari NSX/20 | 4Meg | PEC 37651 | 259.00 |
| Bondwell 8310, Plus | 1Meg | 23050-09100 | 109.00 |
| Bondwell B310V, SX | 1Meg | | 109.00 |
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| Canon Notejet | 4Meg/ 6 Meg | | 219.00/419.00 |
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| Everex Tempo LX LX20, Carrier | 2Meg | PCA 00053-0001 | 109.00 |
| Gateway 2000 Nomad 425 DXL/SXL | 4Meg/16Meg | | 199.00/1549.00 |
| Gateway 2000 486 Hardbook | 4Meg | | 199.00 |
| | 16Meg | | 799.00 |
| Goldstar GS520 386SX/16 | 4Meg | S386-4M | 249.00 |
| Grid 1720 1750, 1755 | 1Meg | | 49.00 |
| Magnavox Metalis | 1Meg/4Meg | 286, 386SX | 109.00/199.00 |
| NEC Prospeed 286 386SX-16 | 1Meg | PC21-21 | 79.00 |
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| NEC Prospeed 386 | 2Meg | PC31-21 | 110.00 |
| NEC Prospeed 386 | 8Meg | PC31-22 | 389.00 |
| NEC Prospeed 386SX-20 | 1Meg | PC43-21 | 79.00 |
| NEC Prospeed 386SX-20 | 4Meg | PC43-22 | 199.00 |
| NEC Ultralite III/20, 20P, 25C | 2Meg | PC47-21 | 109.00 |
| NEC Ultralite III/SL/25C | 4Meg | PC47-22 | 199.00 |
| NEC Ultralite SL/20, 20P | 6Meg | PC49-21 | 309.00 |
| NEC Ultralite III/25C | 8Meg | PC47-23 | 389.00 |
| NEC Ultralite Versa | 4 Meg/8Meg/16Meg/20Meg | OP4104 | 183/369/799/988 |
| Packard Bell 386SX, 286 | 1Meg, 4Meg | 286, 386SX | 109/199 |
| Panasonic CF170, CF270, CF370 | 1Meg | CF-BA165 | 49.00 |
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| Zeos 386SX Notebook | 2Meg | | 109.00 |
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| Epson 6000, Action Laser | – | – | – | 139 | – | – | 229 | – | – | – | – | – |
| Epson Action Laser II | – | – | 89 | – | 228 | – | – | 367 | – | – | – | – |
| Epson 8000 | – | – | 69 | – | 226 | – | – | 367 | – | – | – | – |
| *Epson 1000, 1500* | – | – | – | 129* | – | – | 258* | – | Call | *IN STOCK | | |
| HP 2, 2D– | – | – | – | 109 | – | – | 169 | – | – | – | – | – |
| HP 3, 3D, 3P, 2P 2P+ | – | – | – | 101 | – | – | 179 | – | – | – | – | – |
| HP 4, 4M, 4Si, 4SiMX, 4P, 4MP | – | – | – | 80 | – | – | 169 | – | – | 349 | – | – |
| HP 4L | – | – | 69 | – | – | – | – | – | – | – | – | – |
| HP 3Si | – | – | 69 | – | – | – | 169 | – | – | 349 | – | – |
| HP 4Si | – | – | – | 69 | – | – | 169 | – | – | 349 | – | – |
| HP Design Jet 600, 650 | – | – | – | – | – | – | 169 | – | – | 349 | – | – |
| HP Deskjet 500, 500C, 550 | – | 55 | – | – | – | – | – | – | – | – | – | – |
| HP Deskjet 1200C, 1200C/P | – | – | – | 89 | – | – | 169 | – | – | 349 | – | – |
| HP Paintjet XL300 | 109 | – | – | – | – | – | 289 | – | – | 469 | 637 | – |
| IBM Laser 4019, 4019E | – | – | – | – | – | 169 | – | – | – | – | – | – |
| IBM Laser 4029 | – | – | – | – | – | – | 169 | – | – | – | – | – |
| IBM Laser 4039, 4079 | – | – | – | 99 | – | – | 169 | – | – | 350 | – | – |
| NEC 90, 290 | – | – | – | 139 | – | – | – | – | – | – | – | – |
| NEC 95, 97 | – | – | – | 99 | – | – | – | – | – | – | – | – |
| Oki 400 | – | – | – | 89 | – | – | – | – | – | – | – | – |
| Oki 400 E | – | – | 135 | 109 | – | – | – | – | – | – | – | – |
| Oki 830 840 | – | – | – | 109 | – | – | – | – | – | – | – | – |
| Packard Bell PB 9500 | – | – | – | 139 | – | – | 227 | – | – | – | – | – |
| Packard Bell 9815 | – | – | – | 180 | – | – | 299 | – | – | – | – | – |
| Panasonic 4420/4450I | – | – | – | 129 | – | – | 209 | – | – | – | – | – |
| Panasonic 4410/4430 | – | – | – | 126 | – | – | 195 | – | – | – | – | – |
| Panasonic 4450 | – | – | 99 | – | – | – | – | – | – | – | – | – |
| TI XL/PS17/PS35 | – | – | 55 | – | – | – | – | – | – | – | – | – |

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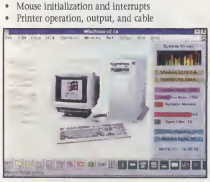

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PC MAGAZINE EDITORS' CHOICE December 17, 1991

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Plus get a **FREE SCANPAD!** (a $20 value) with the above $59 offer!

*Source: Average of 3 prices quoted by Egghead Software stores in the San Francisco area on April 14, 1994.
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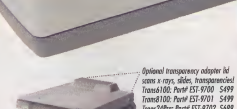
* BEWARE OF SLOW, NON-STANDARD PARALLEL INTERFACES!



*Optional transparency adapter lid scans x-rays, slides, transparencies!*
*Trans6100: Part# EST-9700 $499*
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*A $249 Value*

## NEW DIGITAL DARKROOM THAT BEATS PHOTOSHOP!

Image Folio, the internationally acclaimed, award-winning image editing software is now included with Envisions' scanners! Image Folio is a hot new image processing and editing software program that makes your job fast and easy! Here's all you need to become an image processing and editing expert!

- Fully Twain compatible to scan directly into your open software application
- User-defined color reduction capabilities give you optimal 24-to 8-bit image conversions
- User-editable color palette for exact color reduction
- Real-time editing previews during editing shows instantaneous enhancements
- Color variations feature lets you adjust hue, saturation, brightness, contrast, with real-time tiles
- Drag & drop selected items among documents —even Photoshop can't offer you this ease of use!
- Multiple file accessing allows users to open thumbnail images of files at once to save time
- Auto and intelligent manual image stitching for large-sized images, perfect for oversized drawings! Merges images multiple times and in unlimited directions
- Monitor and printer gamma controls
- Opens/saves in TIF, PCX, BMP, TGA, GIF, JPEG, PCD, EPS
- JPEG Compression to save valuable disk space
- Text tool to add True Type fonts to your image

*Envisions Flatbed scanners and bundled software require 286 or higher, Windows 3.1, 4MB RAM, 20MB hard disk space free. 486 slot available for interfaces and (included) PS/2™, IBC™ and Apple® Macintosh versions are also available.*

| Envisions Scanner Model | ENV 6100 | ENV8100 | ENV24Pro |
|---|---|---|---|
| Base/Maximum Resolution | 600/1200 dpi | 800/1600 dpi | 1200/2400 dpi |
| Software Included | Image Folio | Image Folio | Image Folio |
| Part # | EST3081B | EST3083B | EST3087B |
| Your Price | $499 | $699 | $999 |

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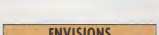
# Envisions' Scanners Pack More Performance than Hewlett Packard's!

## ✔VOTED "BEST COLOR" BY PC COMPUTING!

Envisions beats Hewlett Packard and the rest of the pack by bringing you the best color output in a desktop scanner. But don't take our word for it: just ask *PC Computing*. After evaluating a host of desktop scanners, *PC Computing* placed the Envisions ENVB100 right at the top of the list. That's because we've engineered our scanners to offer you what few other scanners can match: a superior dynamic range, far more thorough color sampling—to yield more true-to-life scans!

**ENVISIONS**



*Great Color! And What Dynamic Range!*

VS.

**HEWLETT PACKARD**

*Not Bad, But Certainly Not the Best**
*Why Would Anyone Spend Hundreds More to Get Less?*

## ✔PRECISE COLOR PREVIEWING & EDITING CAPABILITIES IN A GRAPHICAL FORMAT

All Envisions' desktop scanners allow you to preview your color image after the prescan in a histogram format—one sophisticated feature Hewlett Packard seems to have forgotten. As a graphic equalizer is to sound, so an Envisions histogram is to color. The histogram is used to fine-tune individual RGB values, something you might have thought could only be achieved only after the scanning process, say, in an image editing program. It quantifies color density in your image, or to a portion of it, in a precise, easy-to-comprehend graphical format. Envisions thinks the more control you have over your image's color at the earliest step of the scan, the happier you'll be with the final results. What do you think?

**ENVISIONS**

*View and Adjust All 24 Bits of Color in Red, Green, Blue Before Scanning—256 Levels per Color!*

VS.

**HEWLETT PACKARD**

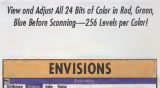
(This space intentionally left blank)

*Are We Missing Something???*

## ✔AUTOMATIC MOIRE CORRECTION OF PRESCREENED ART

Scanning a full-color or grayscale image that's already been printed usually means a trip to Speckle City; your scanned image picks up the dot pattern created in offset printing, resulting in an undesirable moiré pattern. A moiré is an unwanted artifact appearing to make your image ridden with dots. Envisions' scanners give you a time-saving optional descreen control to get the dots out of the way.

**ENVISIONS**




*No More Moirés!*

VS.

**HEWLETT PACKARD**

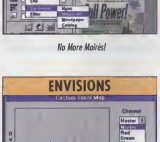
(This space intentionally left blank)

*Do Not Adjust Your Screen! There's No Descreening Feature*

## ✔PINPOINT TONAL CORRECTION CAPABILITIES

Envisions has taken tonal correction out of the Dark and Light Ages. In the past, to boost the highlight in a too dark area, usually meant using the Brightness or Contrast controls on your scanner. You were always sacrificing one portion of your image to correct another, because of the limitations of global adjustments. Our Tonal Map Correction lets you modify highlights and shadows as you see fit, in any portion of an image you choose. You can even make individual pinpoint adjustments to only the Reds, Greens, or Blues in your image.

**ENVISIONS**




*Virtually Unlimited Tonal Correction Capabilities. YOU pick the Point of Correction.*

VS.

**HEWLETT PACKARD**

*Who's In Control Here? Their Tonal Mapping Allows for Adjustments on Only Three Predetermined Points—not a very precise or practical method of tonal adjustment.*

**Source: PC Computing, April 1994, comparison of ENVB100 and HP ScanJet IIcx™*

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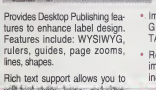


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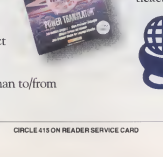


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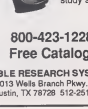


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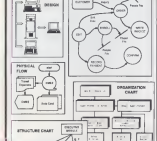


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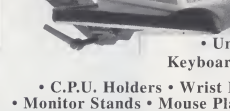

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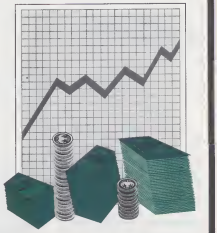

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# CD-RONWhite

# Art Attack

We feared it was going to be one of *those* months—a month in which the best CD to come our way is The Albanian Language Tutor . . . when there isn't even a CD worth making fun of, much less something to get excited about. Then the avalanche struck: a fistful of Windows CDs worth buying—or at least ridiculing.

**Deface the Masters:** Only Microsoft marks up great art with impunity.

## MICROSOFT ART GALLERY ●●●●●

Planning a visit to London's museums this summer? Thought not. Same here, unless they start putting tickets for the Concorde in Cracker Jack boxes. But the Microsoft tourist board can show you London's National Gallery—a treasure trove of more than 2,000 paintings from the thirteenth to the twentieth century—from the comfort of your own PC.

This is more than a classy art show. Its animations bring the works to life, demonstrating composition and artistic tricks, as well as how paintings are restored. And it's better than a traditional tour because you can draw red lines on great art without being arrested. If you love art, this is a CD you'll return to again and again.

**Microsoft Art Gallery** / Microsoft Corp. / (800) 426-9400 / (206) 882-8080 / $78.95
*Circle No. 891 on Reader Service Card*

## MYST ●●●●

Myst is the first New Age game. Or maybe it's a nongame, or an art show. Take your pick—you'll find them all in the Windows version of the game that drew raves on the Mac.

You don't shoot anyone in Myst, and you don't die. Instead, you explore a small, deserted island searching for . . . well, you don't really know, and it doesn't matter. The illustrations are so beautiful that just wandering the island is like a relaxing walk in a new park—one with buildings to explore, switches to throw, and a space ship to check out. Incurable overachievers will soon find puzzles to solve, other eras to visit, clues to follow, and, finally, an objective to the game. But a soothing soundtrack of music, wind, and waves makes the game equally fine for kicking back.

The game packs more than an hour of animation, but the scenes cut from one to another with no transitions. In addition, scene changes lag—even on a 66MHz 486 with a quad-speed CD-ROM drive. If you want action, try Street Fighter. This game's for laid-back, absorbing entertainment.

**Not to be Myst:** Take a stroll in the virtual park; see you in a few hours.

**Myst** / Broderbund Software / (800) 521-6263 / (415) 382-4400 / $55
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## CRITICAL PATH ●●

Critical Path is worth mentioning in the same breath as Myst because we're likely to get a lot more Critical Paths than Mysts on future CDs. Windows multimedia leads straight to this sort of game: You, the player, guide the characters through a story line and watch videos of live actors who react accordingly. Sounds like a good idea, right?

Wrong—at least as it's done in Critical Path. The player controls the characters at only a few specified spots. And the connection between what you do and what happens onscreen is rather vague. A couple of times we made a machine gun appear from nowhere to shoot down the bad guys, but we have no idea how it was done. You're more passive in Critical Path than you are in Myst, which, if you ask me, is backward.

The idea of player-controlled movies is a grand concept. But Critical Path is to that idea what *Flash Gordon* is to *Star Trek: Deep Space Nine*.

**Critical Path** / Media Vision / (800) 845-5870 / (510) 770-8600 / $79.95
*Circle No. 893 on Reader Service Card*

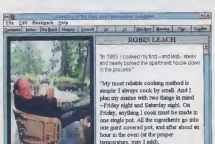
## THE LIFESTYLES OF THE RICH AND FAMOUS COOKBOOK ●●●

This CD is why your PC's sound card has a volume control. With the volume down, you can explore the recipes and ogle celebrities without having to listen to Robin Leach's shouted, grating narration. This "CD-RUM"—as Leach calls it—is a perfectly useless piece of fluff

●●●●● *Take it on your honeymoon* ●●●● *Why aren't all CDs this good?*
●●● *A keeper* ●● *More fun than a root canal* ● *Less fun than a root canal*

PHOTOGRAPH BY JAMES McGOON

# CD-RONWhite




**Rich and Famished:** Robin Leach talks to famous people about food.

combined with some delicious-sounding recipes from Liz and Larry's wedding, the royal tables of Monaco, and other places you weren't invited to.

If you have a burning desire to know more about Jerry Lewis, Eva Gabor, or Ivana Trump (and your *National Enquirer* subscription ran out), watch videos of the famous as Leach drools over them. Or visually sample Katie Couric's chilled cream of carrot soup and Joan Rivers's minced-meat rissoles. Then print out any recipe—complete with a photo of the dish. All this multimedia CD lacks is the sense of smell—and a sense of propriety.

**The Lifestyles of the Rich and Famous Cookbook** / Compton's NewMedia / (800) 862-2206 / (819) 752-6290 / $39.95
*Circle No. 894 on Reader Service Card*

## CNN TIME CAPSULE 1993 ○○○○

Don't you already miss the good old days—1993? Remember the Bobbitt bobbing? Al Gore pinning Ross Perot by the ears? The long-awaited victory of the Jefferson Davis Panthers? What? You don't remember the Panthers' moment of glory? Quick, refresh those memories of last year with CNN Time Capsule 1993: 100 Defining Moments of the Year.

This scrapbook uses Windows video, voice-overs, photos, and text to capture the most fascinating news stories of last year. From the Branch Davidian disaster to the PLO-Israeli peace agreement, and from Michael Jordan quitting basketball to Michael Jackson quitting the human race, it's all there. The video reproduction is some of the best we've seen on CD, making us wonder why all CD video isn't this good. If you're a news hound, you've got to have this.

By the way, the Jefferson Davis Panthers are a Houston high-school football team that last year broke an 80-game losing streak—a nice human-interest story to round out the year.

**CNN Time Capsule 1993: 100 Defining Moments of the Year** / Vicanous Entertainment / (800) 908-9966 / (415) 261-1900 / $29.95
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## 1-2-3 RELEASE 4 FOR WINDOWS: MULTIMEDIA EDITION ○○○○

Forget the floppy version. For the same money, you can buy an animated tour that'll get you into 1-2-3 concepts and procedures much more easily. Even if you already know how to use 1-2-3 backward, check out the CD version's audible proofreader, which reads back your entries as you type them so that you don't have to take your eye off the numbers you're copying. (For the spelling-challenged, it reads back words, too.)

But these are small beans compared to ScreenCam—a Windows utility that will capture everything that you do or see onscreen and record your comments as you do it. The result: instant tutorial. You can distribute the whole experience in a standalone, runtime program that others can use to learn 1-2-3—or any other Windows program. Gone are the days of repeating the same demonstration to every new user of a program. And good riddance to them.

**1-2-3 Release 4 for Windows: Multimedia Edition** / Lotus Development Corp. / (800) 343-5414 / (617) 577-8500 / $495
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## IT'S ALL RELATIVE ○○

Do you have cable? Does your cable company offer Comedy Central? Would you prefer to watch comedians crack jokes in two-minute segments on a 27-inch TV set, rather than a 2-inch-by-3-inch window on a computer screen?

If you answered yes to these questions, don't blow 50 bucks on Comedy Central's It's All Relative compendium. OK, maybe you have some academic interest. You ran out of ideas for a term paper on concepts of familial communication as reflected in contemporary American humor. Then you might want this CD for its jokes about relatives—subdivided by topics such as sex, religion, and dads.

The jokes are funny enough—they were funny when we first heard them on Comedy Central's Short Attention Span Theater. The only advantage this CD has over cable is that Penn Jillette doesn't shout at you between shows.

**It's All Relative** / Time Warner Interactive / (800) 482-3766 / (818) 955-9999 / $49.95
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## EARTHQUAKES: BE PREPARED! ○○○

If you don't live in California, Japan, Mexico, or a remote part of the Indian peninsula, you may want to skip this review. However, if you live in any area prone to seismic uncertainty, this title could save your life—something you can't say about many CDs.

Produced by a Los Angeles engineering firm, this disc has more information than most people—even San Andreas Fault dwellers—want to know about earthquakes and how to prepare for them. But it's presented so well—with one of the best video player interfaces we've seen—that it's easy to roam through the videos, animations, illustrations, and text to find what you want to know. There's even a Yogi Bear cartoon included to drum quake safety into kids. If you get caught in the Big One, don't say we didn't try to help.

**Earthquakes: Be Prepared!** / John A. Martin & Associates / (213) 483-5571 / $39.95
*Circle No. 898 on Reader Service Card*

**A Lifesaver:** Seismic safety drills and tectonic education to beat the Big One.

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# Coming Soon

**HOT 100MHz CPUs** Are you still running a 66MHz processor in that 486? Don't get too comfortable—there's a new wave of Ferrari-fast 100MHz CPUs about to leave that 486/66 in the dust. But before you buy, make sure you see our in-depth review of some of the fastest CPUs ever. Find out if a first-generation 100MHz system is more of a roadblock than a speed demon, and discover the secrets system vendors have up their sleeves.

**LOTUS NOTES SPECIAL REPORT** Can one million Notes users be wrong? How much is this message transport database really delivering to their organizations? Is it for you? We review Notes' usefulness in three scenarios to see if it is living up to its potential as a key information link. Also, get a glimpse of the Notes of tomorrow.

**DBASE FOR WINDOWS** At long last, the trailblazing desktop database comes to Windows. Almost seven million people have grown accustomed to dBase's features—but how will these translate to Windows? In an early peek, we review its tools and run it through a battery of usability and speed tests.

**DIAL-UP DATABASES** Forget all the talk about the proposed Information Superhighway because quietly, while no one was looking, someone built it. We're talking about BBSs—information banks that range from one-line mom-and-pop shops run as a hobby to full-fledged bulletin board forums with dozens of phone lines.

**DIRECT 60** Not sure where to purchase your next Pentium? Worried about support for a multimedia PC? Here's where to find out if your hunches are right. This year we've upped the number of direct-mail vendors in our roundup from 40 to 60, and the result is an insider's guide to the best sources.

**ALSO NEXT MONTH**

**Ed Bott** describes how to get the most out of the Help files that come with most major applications, plus how to create your own.

**You're the new network** administrator and your first job is to buy a new NetWare server. What do you look for? John Montgomery explains everything.

**Plus, don't miss out** on how to fire up your display using a new 64-bit video adapter. And introduce yourself to a graphical—and free—interface to the worldwide web of knowledge.

# REMEMBER TONYA?

A videotape of Tonya Harding nude was circulating, but I didn't even bother to score a copy for my extensive, goofy, and exceedingly offensive video collection. That's how passionately I didn't care about Tonya Harding. I also didn't care about Bobbitt. Assault cases, on anyone or anyone's, just don't deserve that much attention. There is, unfortunately, one part of Tonya's story that has to be of interest, especially to those of us who run our businesses by computer. (Sorry, but there's this new cheese at the mag who thinks I should tie my columns to computers right at the get-go. I always thought the word *Computing* in big letters on the front cover would give y'all a hint where I was going, but . . . he's the boss.)

**68 Messages** At Lillehammer, the Olympic athletes were given e-mail accounts. The account numbers were the numbers on their backstage passes (in my world, everything is showbiz). Each account's password was the birth date of the owner. Everyone was advised to change the password to something that was secret (and easier for a bobsledder to remember). It's like hotels using the first three letters of your name as the password for voice mail. I change mine right away (I never know whether it's "JIL" or "GIL" anyway), but I guess Tonya had other things on her mind.

The story is that Michelle Kaufman of the *Detroit Free Press*, Ann Killion of the *San Jose Mercury News*, and Jere Longman of *The New York Times* logged in to Tonya's account, saw that there were 68 messages, and logged out. They said they were just seeing if they could do it. They were proud of themselves; they had been clever enough to read Tonya's code off her credentials on TV and read a bio for her birthday. *Oceans Eleven* it ain't, but for a reporter, this is hacking. They bragged about it. These guys probably went out for Chinese food, threw away their hair-care products, and started drinking Jolt for a day.

Michelle, Ann, and Jere still have their freedom, their computers, and even their jobs. This has been causing some real hackers on the Net to flame. When kids broke into computers and looked around, T-men put the fear of Uma Thurman into the little geeks, confiscated all of their computer equipment, and made them do icky community service. Then Mom and Dad had to pay all future allowance to lawyers for weaseling the rap off Junior's permanent record. You know, the real record, the one that *does* stay with you the rest of your life.

The newspapers should fire the Lillehammer whammer-jammers. They should be punished. Following Tonya around, yelling questions at her, and taking her picture is OK—she's a public figure—but we can't let them break into private communications. They can't open her mailbox to see how many letters she has. What they did was wrong.

**No Honeymoon** You may think it's strange that I go ballistic over a few sports reporters seeing how many e-mail messages Ms. Harding sent and received and find no problem with her topless honeymoon tape falling into the hands of creeps like me. Don't her private parts deserve more privacy than her less primal communications? No. Her husband camcorded with her permission. She knew he would be in possession of that very personal honeymoon communication. And she must have known this guy was a dirtbag. Jiminy Cricket—look at him. You shouldn't let this guy valet park a rental car, let alone own a bride-blushing video.

**OCEANS ELEVEN** *it ain't . . . They should fire the Lillehammer* **WHAMMER-JAMMERS** *. . . Rental car, let alone own a bride-***BLUSHING** *video*

**Go-Go's Boot** If she had written a message to one of her scumball friends on that Lillehammer server that said, "By the way, I got 68 messages on this cool computer today," and that person printed it out and sent it out on the wire, that would be fine. Once someone sends you a letter or allows you to videotape them, that "information" belongs to you, but you can't tamper with the mail. The fact that it's electronic doesn't change anything.

If you're ever over at my house, remind me to show you my bootleg Go-Go's Hotel Tape.

PHOTOGRAPH BY JAMES MCGOON. ILLUSTRATION BY GERALD FRAMPTON

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